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THE
ENCYCLOPEDIA
OF HEALTH
AND PHYSICAL CULTURE

BERNARR MACFADDEN
EDITOR-IN-CHIEF

A COMPREHENSIVE GUIDE TO THE PROPER CARE
AND COMPLETE DEVELOPMENT OF THE HUMAN BODY
WITH DETAILED DIRECTIONS FOR THE
PREVENTION AND TREATMENT OF DISEASE

INCLUDING SCIENTIFIC METHODS FOR BUILDING
DYNAMIC, POWERFUL HEALTH AND ATTAINING
A SYMMETRICAL, BEAUTIFUL BODY

ARRANGED FOR READY READING
CLASSIFIED FOR IMMEDIATE REFERENCE

IN EIGHT VOLUMES

VOLUME III

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EXERCISE AND HEALTH

*Foreword
by the Editor*

A STRONG and well-formed body is a great asset in life. It gives one a certain amount of protection in adversity. It makes easier the great problem of living, which is the adjustment of the individual to his environment. It enhances all one's pleasures and creates sensations of happiness which are largely independent of external circumstances.

When you come in contact with an unhappy situation, if you possess unusual vitality and vigor, if you are really strong, with the poise and power that belong to a finely developed body, you may rise above this adverse situation. Even though it strike you down for the moment, you have the ability to recuperate. All the vital forces will rally to a special effort, and through this reaction may come the activity or the ideas which may carry you to achievements you would not have thought of before misfortune came.

**Health and
Happiness**

Of course, this describes an extreme condition. But there are many less serious situations in life which we have to meet, and which are annoying and irritating. If your health is good, if your body has certain reserves of strength and buoyancy, these are easily handled. If your vitality is already somewhat depleted, little things will often assume mountainous proportions. They become more than merely an annoyance. They cause severe suffering. Therefore, you must admit that your physical condition has much to do with happiness and unhappiness.

Happiness, after all, is partly imaginary. If you think you are happy, you are happy. If you think you feel miserable, you are, in truth, miserable. Happiness depends almost entirely on our reaction to our environment. Some people are satisfied with things in life which make other people very unhappy. Some people with every external means of happiness within their grasp persist in being miserable. There is,

of course, a mental and emotional element in this which often needs special attention along with the general attention to health. But a well-worked-out system of physical activity combined with intelligent diet goes far to correct mental and emotional difficulties and to create the inner sensation of happiness.

Exercise
and Vitality

The increased activity of heart and lungs through exercise brings a physical buoyancy which makes you feel as if you were treading on air, and life then begins to seem delightful. The more harmonious functioning of the body and the greater flexibility and responsiveness of every limb and muscle give you a sense of ease and serenity. And in this intensifying and harmonizing of all the inner life you will consider yourself fully repaid for all the effort you have made to glorify the body through physical exercise and other necessary measures.

UNUSUAL PHYSICAL POWER THE RESULT OF EFFORT.—It must be admitted that unusual health and physical power seldom come to a man without effort on his own part. You must know how to develop your physique, and then how to keep this development once it is attained. The general routine of life, as we grow to maturity, leads most people to believe that health comes to us in the natural course of events;



PHOTOGRAPH PACIFIC & ATLANTIC

Mothers have learned that creeping is not a necessary preliminary to the infant's first steps. Yet it remains one of the instinctive attempts at exercise to be observed in childhood. This picture shows two youngsters nearing the walking-stage engaged in a creeping race.

that it requires no special knowledge, and that if you just go on in the ordinary way, adhering to the conventional habits of life, you will naturally acquire health as you acquire full growth.

Health of a superior sort and real strength and beauty of body do not come in that way. You must first acquire the knowledge necessary to perfect the body and then you must adhere to the rules thus indicated. In the beginning you may have to make sacrifices. But the habits inculcated will ultimately become fixed and will cease to seem a hardship.

Now let us suppose that the reader has not made any special study of body building and wishes to begin with a dependable foundation. We will start with the question, "What is the most important factor in building a superb body and perfect health?" Naturally we have to admit that inherited vitality is probably the most important. But laying that aside as being beyond one's influence, what is the next most vital source of health building?

There is little or no chance for argument against the conclusion that proper nourishment of the body is the first essential to perfect health and physical power. The physical and mental processes are maintained by the air we breathe and the food we eat. Though we must emphasize the importance



PHOTOGRAPH PACIFIC & ATLANTIC

Interesting as the athletic efforts of the young child may prove, precautions are advisable against fright as well as injury.

**Factors in
Body-
Building**

of food, even in connection with exercise, this matter is, of course, fully discussed in the preceding volume on diet, and may be dismissed here with a simple indication of its supreme importance. But breathing is so closely associated with the matter of exercise that one may class it either as a form of vital nourishment or as a form of physical activity. In fact, it is both.

BREATHING.—The first important factor in the upbuilding of the body is the oxygen that we breathe into our lungs in the form of air. Many persons who are in other matters especially particular, do not seem to consider that the air they breathe is of much importance. You cannot possess your full quota of health unless you breathe pure air.

Fresh Air
and Health

We can live without food for many weeks; we can live without water for several days; but we cannot live without air for five minutes. One of the first essentials, therefore, in building health—an essential preliminary to all the forms of exercise described in this volume—is to assure yourself of a continuous supply of pure air. Open your windows widely, in your bedroom especially. Be sure of supplying yourself with fresh pure air, day and night.

Many people admit the advantage of fresh air but are afraid of drafts. After all, a draft is nothing more than a current of air. It at least insures you a supply of fresh air and the impure air that has been exhaled from the lungs is carried away and new air brought to you to use. To be sure, when the body is too suddenly chilled, one often acquires what is called a cold. In nearly all cases this only proves that your vital condition is not satisfactory. The fact that you can chill your body seriously on one occasion without catching a cold, while on another occasion a slight chill will produce this complaint, proves that it is the condition of your body and not the draft which causes the cold.

Confined air is a menace. Wherever you may be, try to insist on a free supply of pure air. Our health authorities everywhere are using their influence to insure the proper ventilation in public places. The time ultimately will come when not only shall we be guaranteed a pure supply of air in such places but we shall also have the temperature and humidity regulated as desired.

EXERCISE AND GROWTH.—After the nourishment of the body with pure air and proper food we must place the exercise of the muscular system of the body as the next most important factor in building superior health. The major proportion of the weight of the average individual is made up of muscular tissues. We cannot maintain these muscles in health without exercise. They never acquire their full growth unless they are fully used.

When a boy or girl grows to maturity without the use of the muscles that are essential to bring out their full strength, that boy or that girl does not come into possession of all manly or womanly powers. Even when a man has grown fully through the exercise of all the muscles of the body and he allows these muscles to become soft and flabby through lack of use, the full penalty must be paid for this omission.

Not so long ago people had the idea that a strong man or superbly developed woman owed superiority to methods beyond the reach of the ordinary person. We now know that the body is developed, strengthened, perfected in all its parts, first through being supplied with the nourishment essential to build up every part, and second by the regular use of the muscles necessary to expand them to their most complete power.



PHOTOGRAPH PACIFIC & ATLANTIC

To overcome fear of water is the first step in the making of a swimmer.

Exercise in
Childhood

Activity of
Women and
Men

You cannot become alive in every sense without developing the muscles of your body. You cannot retain that aliveness which makes life really worth while unless you continue the use of your muscular system at reasonably regular periods throughout your whole life. Naturally, we must admit that some persons owe considerable bodily energy and prolonged youth to the inheritance of extraordinary vitality from their



PHOTOGRAPH PACIFIC & ATLANTIC

Imitation being a primal instinct of childhood, we may attribute to this trait much of the assured air and manner of this young boxer—although he happens to be the child of a noted figure in the boxing ring.

ancestors. Such people apparently break the laws of health, and yet retain their vigor. They are spending the vitality of their forefathers and their progeny may have to pay the penalty. There is usually no mystery about the source of unusual physical power. If one were to study the habits of life of those who display unusual bodily strength and vigor into advanced life, the explanation would quickly be found in diet and in exercise.

You cannot hibernate in a sedentary occupation and expect to keep either manhood or womanhood. Women grow old faster than men because they fail to use their muscles as they did in their youth. Men are usually more active, even when they know little or nothing about physical culture, and, because of this activity, they maintain their muscular vigor and suppleness for a longer period than do women.

EXERCISE AND THE VITAL FUNCTIONS.—When you stop using your body at certain regular intervals you begin to die at

a rapid rate. Your body harbors dead cells that encumber its activities, interfere with the elimination of impurities and invite disease. To keep you really alive, your blood must circulate freely throughout every part of the body. When the muscles of the body are exercised the blood is called in much greater quantity to the tissues so used. New live cells develop; the dead cells are carried off, eliminated, thrown out of the body.

It is thus the muscles become renewed, made over again, and the process of growing old is greatly retarded. In fact, the time may come when the process of growth and repair is more clearly understood, and when, in consequence, we may be able to prolong youth indefinitely. We may be able to live until the desire to live departs. We may be able to keep our bodies youthful until we become tired of life.

At this time very little is understood about many of the processes which are associated with growth and other vital functions. Nevertheless, the requirement, so far as exercise is concerned, is comparatively simple. The muscles of the body must be used with reasonable regularity. There should be no overtraining or overstraining. The exercise that one may have taken in early years may be continued almost indefinitely into advanced old age, if you do not at any time overstrain or overwork the muscles.

Effect of
Exercise on
Energy

Some authorities say that a man should not take certain exercises after he has reached a certain age. However, if a man has played a certain game all his life, and if his habits of eating and living are otherwise healthful, there is no reason why he should not continue it indefinitely. In most cases he may have to make his exercises less strenuous. A man's favorite exercise should be a source of comfort and pleasure, and should, of course, be discontinued if it proves otherwise.

Many mental workers will tell you that they have tried to avoid physical exertion, that they want to save all their energy for mental work. They do not know that energy expended by the brain comes from the body itself. A body that is thoroughly nourished and exercised in every part has a strong heart and a good stomach and will naturally nourish the brain far more satisfactorily than will a weaker body. One must have energy back of one's mental efforts. Enthusiasm

and ambition fade away unless one has an active body.

How STRONG BODIES ARE BUILT.—Strong bodies are built:

First, by the vigorous exercise of the muscles for a reasonable time at regular intervals.

Second, through the influence of the greatly increased circulation of the blood brought about by exercise.

Third, by the purification and vital quality of the blood caused by the increased activity of the lungs in exercise, and by the pureness and freshness of the air inhaled.

Fourth, by the influence of exercise on the character and quantity of food that is eaten.

Muscles are developed only through their proper and regular use. It does not make much difference what system you use, provided your exercise is taken with spirit. If a man goes through his exercises sluggishly, with little or no enthusiasm, he may develop big muscles but they will not be unusually capable. One is not inclined to envy the strength of a plodding mule. Exercise should be made as delightful as possible. You should get all the fun you can out of it. That is why muscular activity associated with recreation is so beneficial. But even if you go through a set form of exercises, you should cultivate the ability to enjoy them and be ever on the alert, through the discovery of new exercises, to keep them from becoming monotonous.

Objects of
Exercise

In taking exercise most men have before them either the ideal of the strong man with great knotty muscles, or of the man who has the physical presence which makes for live, effective personality. Most women have before them the ideal of grace and beauty. These ideals may be attained by practically everybody who wishes to give the necessary effort to exercise. But they cannot be attained all at once. You cannot change the physical appearance in a day or a week. It takes months and even years to secure satisfactory results. There must be the will to be strong, the intelligence that directs one's activity and then the persistence to keep at it indefinitely.

WALKING THE BEST OF EXERCISES.—Occasionally one hears of a man who says that he is eager to develop his physique by exercise but that he lives in a community where there is no gymnasium, or that he lacks the money to join if it is there.

There is no excuse for a man not taking exercise unless he is paralyzed. Anyone who can use his legs can walk and walking is the best and cheapest of all exercises. No exercise equals it as a means of developing vitality. Athletes when training for a contest always cover a prescribed distance on foot every day. Boxers and wrestlers who want to build the highest possible degree of strength and endurance find walking especially valuable. Walking enlivens the whole personality. It brings one in contact with all that is beautiful and soothing and interesting in nature. It takes one out among men and gives one a sense of sharing in human activities. It uses mind and heart in the exercise of the body.

**Building
Strength and
Endurance**

Walking is the simplest of all remedies and the most natural. You can even walk away your troubles! If your soul is being scorched almost beyond relief, get out into the open air, in a costume that will not interfere with a swinging



PHOTOGRAPH WIDE WORLD

Walking tours, long regarded by Germans as healthful and enjoyable, have, of recent years, gained added health value by the development of interest in sun-bathing and freedom from clothing.

stride. And then walk. Not for a mile or two, but until the muscles begin to feel fatigued. Rest a while and then continue your journey. Even irreparable grief can often be relieved in this way. It conforms to one's innate instincts—the desire to do something, anything, to get away from the strain one has to endure.

Other activities that bring into play the muscles of the body are valuable, but first and last, walking is the best—miles and miles, and still more miles.

When you are under great emotional strain, if you are strong enough, start on a walking trip. Forget the automobiles and the railways. Commune with Nature. Walk and breathe, fill your lungs to their greatest possible capacity. When you are tired, rest, but then continue your walk. Take one day or several days. If you go to bed at night exhausted, so tired that you fall asleep immediately, so much the better. The physical tiredness will take away the mental strain.

Psychic
Effects of
Walking

After one or two days of this activity you will find your spirits returning. You will begin to eat and enjoy your food like a workman. And, remarkable as it may seem, in a few days the tragedy that you were convinced had wrecked your life will begin to assume less importance. You will not forget it; it will still be with you; but you will begin to acquire more confidence. You will begin to master yourself.

Such a change can be wrought through the wholesome influence of long walks continued for several hours each day. As one acquires more strength, twenty, twenty-five, or even thirty miles may be covered in a day.

Few people know the great value of this simple, dependable remedy for human suffering. Its amazing worth should be understood by everyone. Do not allow yourself to be cast down. Avoid moping in solitude. Seek the open air and sunlight. Look for the path that takes you out into the woods. On that path is health and salvation for every tortured soul.

ATHLETICS AND BODILY DEVELOPMENT.—While walking is the basic exercise for everyone, most people need to cultivate some form of athletics or sports. These are so much a part of modern social life that participation in some popular form of sport has become the readiest means to pleasant association with one's fellow men.

Athletics and sports have a valuable reaction in the life of the individual, quite apart from the physical benefit. School athletics are useful not only because of their influence in developing beautiful bodies but because they also train character and evolve a higher standard of life generally. Nearly always they teach one to respect one's own body. Competitive athletics give one a taste of the strenuous competitions which one must come in contact with when one meets the realities of life.

Success of an unusual sort cannot be attained without knowing how to fight for it. One must be ready and willing to fight for what one wants. But fighting in this sense does not mean physical struggle. It means hard work and intense application. There is an old saying in England that the British Empire was won on the playing fields of Eton.

Athletics
and
Education

Athletics of the right sort give a man a feeling of self-dependence. They make him realize the necessity for preparing himself for whatever field he expects to enter in order to win. He learns that what counts is not only physical fitness, but technique, or "form" and team-work. He learns to think as he acts, to keep his head and his temper in the midst of the mob.

Athletics of all kinds should be associated with education



PHOTOGRAPH PACIFIC & ATLANTIC

In the increasing interest of women in dancing and athletics, appreciation of beauty and health go hand in hand. Here appears a class of German girls dancing outdoors to music provided by a portable phonograph.

of the mind from the kindergarten upward. Physical development should parallel the mental development. They should never be separated but closely interwoven throughout every day. Any game that requires endurance and grit develops courage and determination and builds character. Abilities that come from training of this sort are useful to all men in any sphere of life.

WOMEN IN ATHLETICS.—Exercise is just as valuable to a woman as to a man for the essence of attractiveness in women is physical. Women have even more need than men for courage, endurance and vigorous physical functioning. A woman transmits her qualities to her children. It largely depends on her health of body and corresponding wholesomeness of mind, whether her children are vigorous, vital and beautiful, or weak and devitalized.

It is regrettable that many people still feel that women have no place in competitive sports. Competitive athletics must furnish women the stimulus necessary to interest them in health building. Though some women may appear mannish through overtraining, they are the exceptions.

Women in
Competitive
Sports

The far-reaching effects of physical training in competitive sports for women cannot be overestimated. They not only create character and energy but they create beauty. They give the vivaciousness, the aliveness, which truly enhance beauty of form. They make the body firm and strong, brighten the eye and clear the complexion.

Athletics develop the suppleness and symmetry which every woman desires. Other modes of intense training may sometimes take off some of the flesh which rounds the figure enticingly, but as soon as the unusual activity ceases, the figure takes on an improved appearance as a result of the training.

Athletics properly used make a woman more beautiful, make her a far better sweetheart, a more alluring wife and a more dependable mother. Unhappiness in marriage can often be traced to the fact that women are defective in physical vitality. Beauty, health and strength must be companions. If health goes, beauty disappears. The oversupply of vital vigor which makes a woman brilliantly alive and keeps her bubbling with animation may be developed by active sports.

With the recognition of the equality of women in other fields of effort there is no reason why athletic meets should not include both sexes. Some girl athletes can excel some boys in many kinds of athletic activities. They can be handicapped, not as boys and girls, but in accordance with their abilities. Though at present many men might feel they were disgraced if beaten by a girl, that attitude of mind should be discarded.

The story of Atalanta, the princess of Greek mythology who promised to marry the suitor who could outrun her, might be repeated in modern times. The romantic and humanizing influence of women need no longer be lacking even in the field that used to be called "manly sport."

"Womanly"
Sports

Just as important, though less strenuous, are the various social sports—swimming, tennis and golf. Swimming is particularly valuable in creating general bodily symmetry. Tennis



PHOTOGRAPH PACIFIC & ATLANTIC

In Sweden, calisthenics long have been popular. In this illustration appears a group of Swedish gymnasts in mass exercise.

is a highly invigorating game which would be even more valuable if played in the swimming suit. Then there would be an opportunity to take a sun-bath while playing. All outdoor games of this sort improve the personality. They bring one out into the light and the air. They create social contacts and make for physical and social ease among other people.

CALISTHENICS.—The generally vitalizing effects of all games can be increased if one also practices some regular form of exercises for developing all the various parts of the body. Exercise of this sort can do almost anything to improve the general appearance of the body, except greatly to increase the height or alter the actual outline of the features. But the impression one's physique makes upon other people is the result of many complex factors. Though height may not be greatly increased, increased physical development gives an impression of greater size. Moreover, improved posture enables one to take advantage of all the height he has, which often means that he adds to his appearance several inches which he has lost by slumping in some way, or otherwise carrying himself badly. But whatever its size, a beautifully developed body is always attractive. It gives its possessor a sense of ease and self-sufficiency. Whatever physical handicaps there may be, full development of all the muscles through regular exercises will either overcome them or compensate for them by calling the attention from irremediable defects to attractions developed through physical culture.

Similarly, while fine bodily development cannot alter the original contour of the features, it does often increase the general impression of beauty. We seldom observe others when they are completely at rest. Our impressions are largely created by a series of movements. Independent of the added brightness of eye and freshness of color which outdoor activity creates, graceful and free movements make even the face more attractive by giving more interesting poses to the head and the shoulders.

Many people, especially women, imagine that they should reduce their weight when all they need is the exercise essential to make firm and healthy the flesh they think they should lose. A properly formed body has a certain roundness essential to symmetrical outlines. Women who develop their bodies prop-



PLATE 33. The editor's physique in his sixty-fifth year.

Encyclopedia of Health: Volume III

erly do not become mannish. They grow more feminine. All the attractive curves which distinguish the feminine form, which make it seductive and personally lovable, are developed through exercise.

The very slender figure which women prize is compatible with charming curves, if in addition to attending to their diet, women also take a regular series of exercises. Bodily beauty has no straight lines; curves are essentially a part of it. Even with the stretching of one's imagination, calves that look like sticks, arms that have every appearance of being skinny, cannot possibly be considered beautiful. Everyone who values both the inner satisfaction and the outward charm which make what we call personality, should study and adapt exercises most suitable to the individual needs.

A REMEDY FOR JAGGED NERVES.—To many people muscular development seems increasingly unimportant in modern life. Tasks formerly performed by strength of human muscle are now performed by machinery. In more primitive conditions even a well-to-do man was likely to find himself performing the tasks of a hewer of wood, or bearer of water, or undergoing physical effort in order to make himself comfortable. In countries where animals exclusively still serve in transportation, exercise is involved in most of life's activities, even on the part of those who do not have to perform the cruder kinds of heavy labor. But in modern city life a man may go through the day, and feel that he is working hard, without lifting his finger in physical exertion. He may step from the elevator into his car, and from his car into another elevator and be carried smoothly and effortlessly from his home to his office, without even putting himself to the trouble of going up or down stairs.

“Nerves”
and
Exercise

This is a great and a recent change in the habits of the human race. One cannot change the life-habits of the race suddenly without encountering difficulties. In the past more or less muscular activity was necessary to survival. We of today are legatees of the muscular development of our ancestors; for we are all descended from those who achieved sufficient physical development to keep themselves going in a world where human muscles had to do the work only recently taken up by machinery. Hence the failure of modern life to

provide enough normal activity for our inherited muscles is one of the causes of the nervous strain from which people everywhere appear to suffer. Many modern people are overwrought. They become irritated at the slightest cause and as one consequence quarrel with their best friends.

Trouble of this kind is frequently due to a lack of physical poise, aggravated, in many cases, by a devitalized diet. People who are nervous and distraught lack vital vigor. They need the poise that can come only through the adoption of proper health-building measures.

**Exercise
for the
Business
Man**

The average business man may say: "But I have no time!" He might as well say he hasn't time to eat or sleep. Proper exercise of the body is just as important as eating or sleeping. Those business men who have taken up golf are finding a wonderful release from the tension of their lives. Golf is one of the best exercises for giving the physical poise



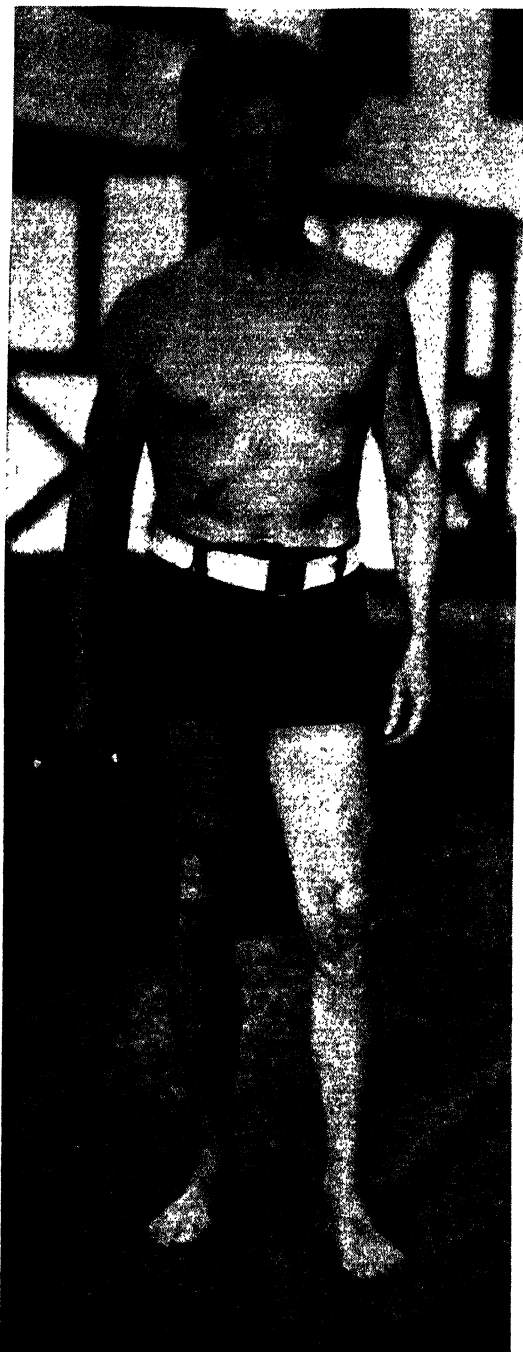
PHOTOGRAPH PACIFIC & ATLANTIC

The ability to enjoy and profit by exercise is not limited to any age, as is proved by such scenes as this class-drill led by a British army officer with members including grandmothers up to the age of 73.

necessary to remedy overwrought nerves. Its main advantage is the walking out of doors over the green turf. One does not have to be a member of an exclusive golf club to be able to enjoy such benefits of the game.

Remember, if you do not have time to take care of and build up your most valuable possession—your own body—you will have plenty of time to attend your own funeral, when the hearse draws up. If you fail to care for and build up the body you are missing many of the delights of life. The care taken of the body, regardless of age, will not only prevent jagged nerves, but will give you ambition, energy, determination, in their place.

The main fault with modern life is that ambitious people fail to realize that they are working with a human machine. If you were to start on



**Health and
Ambition**

A photograph of the author of this Foreword
made at the age of sixty years.

a journey with an automobile you would recognize that this machine must be cared for throughout the journey, that it must be supplied with gasoline, oil and water and that all parts must be in thorough working order.

The comparison is fitting. The human body is a wonderful machine made of flesh and blood. Although its working parts do not require the same detailed attention given to an automobile, nevertheless it must be fed and given the particular attention needed to keep it in thorough repair. Nearly everybody neglects the human machine with which we must work every day of our lives. Much of the attention essential to keep it in repair is ignored, so failure, in nearly all cases, is due to this neglect.

Is Excess in
Exercise
Possible?

HOW MUCH EXERCISE?—The question is often asked: "Can one take too much exercise?" Exercise never killed nor harmed anyone when the proper physical condition was maintained to withstand it. The possession of endurance shows the real physical status. When you make a few muscular efforts and find yourself tired out, you may be overfed or often stimulated with liquor or poisoned with nicotine. The test as to whether you are taking too much exercise is supplied by your own feelings. If you feel more vigorous and vital following the exercise, if you are more alive, if your brain is more keen and you are capable of getting more enjoyment out of life generally, exercise has benefited you. Just to that extent it will lengthen your life and make you more alive while you do live. But enthusiasts should not blame exercise for physical damages caused by dietetic and other mistakes.

EXERCISE IN MATURE YEARS.—One cause of the neglect from which the body suffers, especially as people advance into middle age, is the general notion that active exercise is suitable only for youth. When I myself was in my twenties, I never imagined that one could be actively interested in athletics at the age of sixty. Now I am wondering how much longer muscular exercise can be continued beneficially.

Athletic
Performance
at Sixty

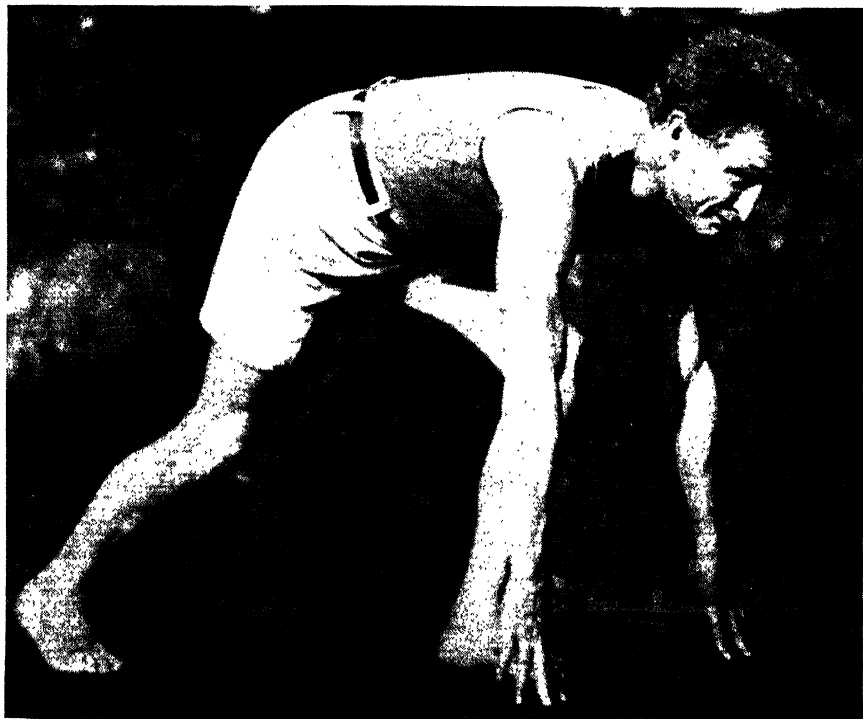
To determine the influence of advancing age upon one's capacity for and interest in athletics, a photographic motion-picture record was taken of my own physical condition in my sixtieth year. I began making the record by taking some exercises in the sun-bath, which I consider one of the most

beneficial adjuncts to health-building, then after several runs to work up to an effective start, I engaged in a 100-yard dash at top speed. I have never made any special effort to gain speed in running, but my speed at sixty years was nearly as good as it was at twenty. I have since timed myself for fifty yards and made it in seven seconds. Running vigorously tests the heart. Both heart and lungs must be in good condition when attempting an exercise of this nature.

**Athletics
at Sixty**

In this test, motion-pictures were made of me playing golf, at which I am a novice. My tennis playing was also photographically recorded. I was fifty-five years old when I first became interested in tennis and every year since then I have partly depended upon this exercise to give me the physical work I need. I never expect to be an expert—to accomplish this I should have started about forty years earlier.

I am especially fond of going bare-foot while playing tennis or any other outdoor game, where it is allowable. I should



Photograph constituting part of physical test made by the editor-in-chief of the Encyclopedia of Health at the age of sixty.

not risk the shocking of members of an exclusive golf club by being so elemental, but at my own home I frequently find it convenient to enjoy the freedom of my boyhood days, when bare feet were less uncommon. My advice to everyone is to go bare-foot whenever you can, both inside and outside of the house. Shoes are an abominable contrivance. They keep the air away from the feet which they tend in many ways to make unhealthy and uncomfortable.

A few exercises with a fifty-pound dumb-bell also form part of the photographic record of my activities at sixty. Exercises of this sort, to be sure, are not adapted to all persons of my age, though I have experienced no harmful results from them.

Weight-
Lifting—
Walking—
Swimming

The start of a walking trip of some twenty miles upon which I have often depended for profitable exercise (with my business office in New York as its objective) was made a part of this photographic record. I also swam for a time before the motion-picture camera. There are many other exercises that I like better than swimming, but I indulge in it frequently because of the very definite advantages that accrue from it. There is no better exercise for general vital development. The various methods of swimming exercise and develop nearly every muscle of the body and the water itself is a stimulant.

Thirty
Years of
Exercise

These records in their somewhat extended form should serve as evidence that while the age of sixty is accepted as within the period of old age, strength and agility may be retained beyond this time. I feel that I am privileged to speak of this now, because the maintenance of health and vigor and continued activity into old age is, of course, the best possible test of the doctrines I began to advocate, against much criticism and skepticism, thirty years ago. Nor is this activity maintained at the expense of general vital functioning, for I placed an insurance policy of one million dollars at the age of sixty.

Of course, where regular exercise combined with careful diet and other habits of life have not been maintained into old age, it is not advisable to begin exercise suddenly. It should be started gradually and should be accompanied by a careful diet and abundant rest. But it is never too late to begin.

B. M.

EXERCISE AND ITS EFFECTS

Section 1

NEARLY one-half of the entire human body (over 40 per cent. by weight) is made up of muscles. This is almost three times the amount of any other tissue or part in the body. The importance of this muscular system is almost in direct proportion to its mass. Many people are inclined to think of muscle and muscular development only in relation to physical activities. They do not understand that muscle-cells have a far more intimate and important duty to perform than merely to produce motion.

The most of our food is consumed in the muscle-cells. Almost all of the oxidizing process that maintains our normal temperature of 98.6 degrees takes place in the muscular tissues. If we destroy any group of muscles, the particular area in the brain cortex that has been concerned in sending out messages to these areas withers up and atrophies.

Another fact that should be borne in mind is that *muscular tissue is the only tissue of the body directly controlled by our will*. You cannot order your stomach to secrete more hydrochloric acid or pepsin, or your pancreas to manufacture more pancreatin, or compel your liver to pour out more bile, with any assurance of having your commands obeyed. Persons who can accelerate or retard their heart-beats by concentrating the mind on this activity are as rare as are East Indians who claim to suspend their animation at will. Most of us, unless we have practiced the art of mental concentration, cannot even stop our brains from thinking. Yet we can order any voluntary muscle of the body to contract, *and it will obey instantly*. Further than this, it will keep on obeying until its power of contracting fails from absolute exhaustion. We are the masters of this mechanism; it is very important, therefore, that we should understand it.

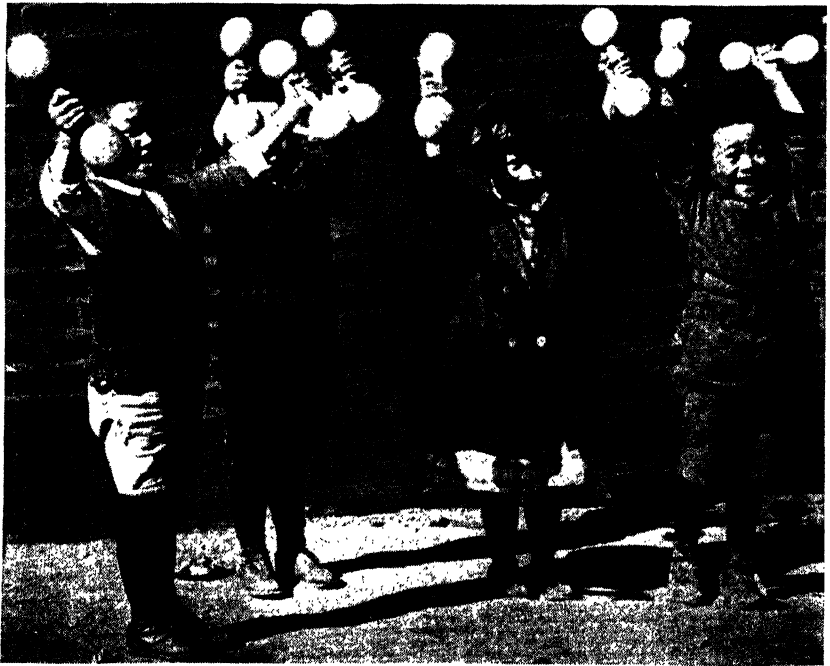
The Muscles
and Health

The value of coordinated and purposeful physical activity as a health measure has been recognized from earliest

antiquity. Although the Greeks seem to have been the first to have left any definite records concerning the art of exercise, it is known that the Chinese, Hindoos and Egyptians were using special exercises or gymnastics, as well as massage (which is passive exercise), for many centuries before the Greeks did so. In fact, it is believed that the Egyptians actually inspired the Greeks in this form of health culture.

The Greeks considered physical exercise absolutely necessary to health preservation. For this reason their gymnasiums were dedicated to Apollo, the god of healing. Herodicius, who flourished in Athens before the Peloponnesian war and in the fifth century B.C., is credited with having been the first to use gymnastics for the cure of disease. He was led to experiment with exercise by the condition of his own health. Having succeeded in curing his infirmities he proceeded to teach his methods to others. They were soon practiced generally, and Greek writers have left us extensive accounts of their effects. Except for this devotion to physical

Exercise and
Civilization



PHOTOGRAPH KEYSTONE VIEW CO.

The message of exercise has rung around the world and reached even Far Eastern lands. Such scenes as this impromptu class-drill by Japanese children prove this.

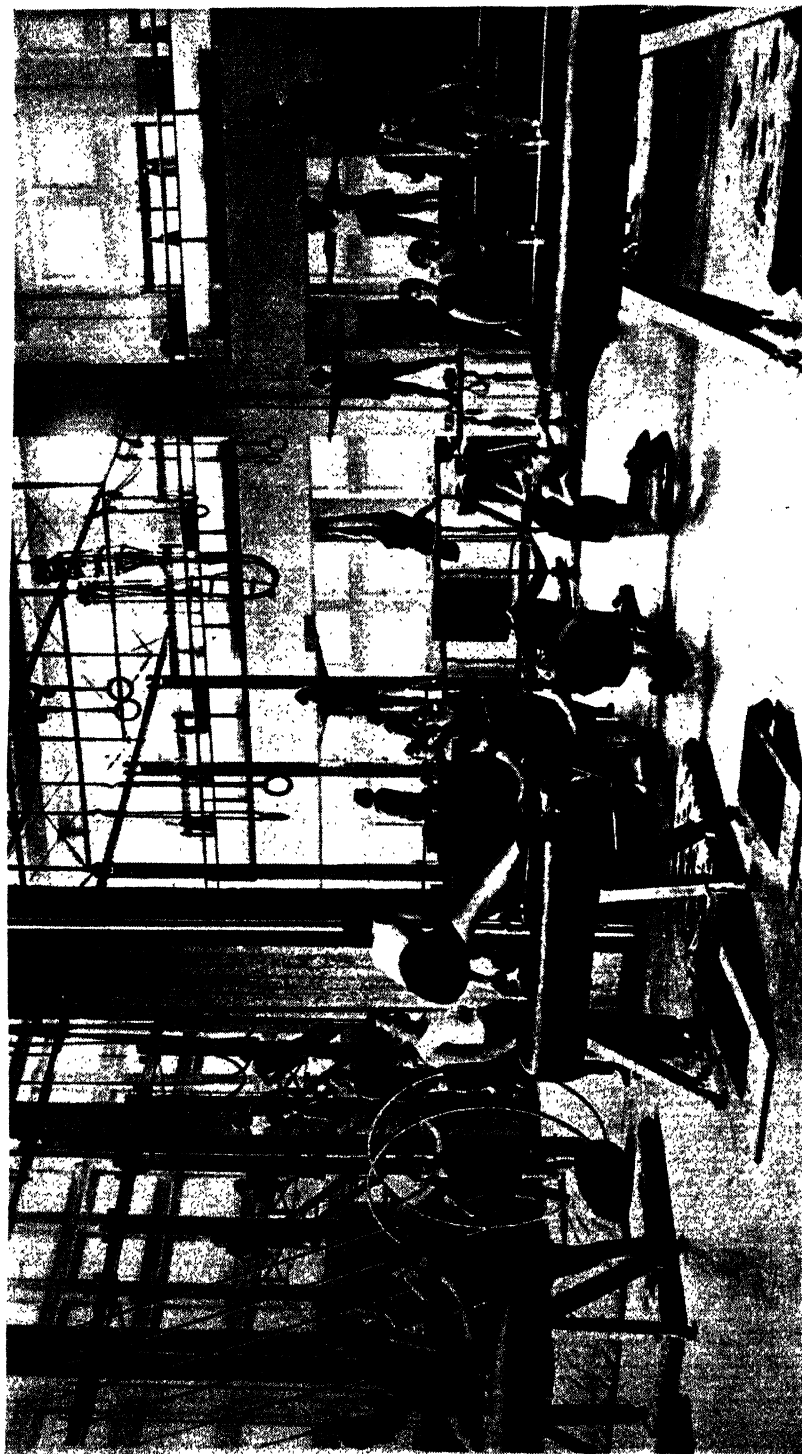
culture and gymnastic exercise, the marvelous art and literature of Ancient Greece might never have existed. With the development of physical perfection came, naturally, an inspiration toward beauty in every form. This was reflected in the life and in the activities of this marvelous race.

When the Romans conquered the Greeks they adopted many of their cultural pursuits and refinements. Among these was the system of gymnastics developed by the Hellenic race. During the days of their glory the Romans were devoted to physical training. With the Decline, however, came that disinclination toward physical exertion characteristic of the sensual, the debauched and the decadent. However, the great Roman physician, Galen, whose influence lasted many centuries after his death, paid a great deal of attention to gymnastics and to massage.

Gymnastics
in Greece
and Rome

The sixteenth century marked the emergence of Europe from the besotted condition in which it had languished for ten centuries or more. Science was reborn, and a decided advance was made over the previous darker centuries in the study and practice of gymnastics and other natural curative agencies. The illustrious Sydenham and other physicians expressed themselves enthusiastically and with constructive effect on the subject of exercise for health purposes.

Early in the seventeenth century the Germans, consistently in the forefront in science and health-building, contributed certain studies of priceless value to the art of gaining health through exercise. At the beginning of the eighteenth century came Frederick Hoffman, who, through his writings, is credited with having done more than any other man of the period to secure for exercise and gymnastics the recognition warranted by their value as curative agents, publishing in 1701 an essay in Latin "On Motion, The Best Medicine For The Body." Then came Boerner, whose valuable treatise, "The Art of Gymnastics," was published in 1748. Hoffman was a staunch advocate of medical gymnastics as taught by the Greeks and Romans, and was influential in advancing this system of therapeutics, not only in Germany, but also in England and France. He declared that gymnastics, by their influence on the circulation, the appetite and the general nutrition of the body, were the greatest of all curative agents. This is quite



PHOTOGRAPH EWING GALLOWAY

This modern gymnasium in Berlin, Germany, is especially well lighted and ventilated, as well as completely equipped. Young women have played an increasingly important part in gymnastics in Germany during recent years.

a broad statement. Experience confirms the belief that it is very nearly correct. After diet *no other one measure* is so important to the welfare of the body as is the *right kind of exercise*.

From this time forward Germany made great strides in general gymnastics, laying the foundation for that devotion to the art of exercise which has been carried to such a wonderful degree of perfection in the "Turner-Bunds" and "Turnvereins" wherever Germans have foregathered. Later on toward the end of the eighteenth century a half-dozen physicians were endeavoring to popularize the art of curative gymnastics in France and in England.

One of the greatest and most important of all contributions to scientific health gymnastics came to us from Sweden. In 1776 there was born in Ljunga, in the south of Sweden, Peter Henrik Ling, a man who was to revolutionize the practice of gymnastics and put the science on a foundation it had never before known. Returning from a foreign tour at the beginning of the nineteenth century, he found himself crippled by rheumatism, due to the privations and hardships he had undergone during his travels. In 1805 he was appointed fencing master at the University of Lund. Here he soon found that the exercise necessitated by his daily work as instructor in fencing was greatly benefiting his physical condition. His rheumatism cleared up rapidly and he regained his former power and vigor. In 1806 Ling began the study of anatomy and physiology, finally taking nearly the entire curriculum laid down for degrees in medicine and surgery. Meantime he was continually experimenting to discover the effects of various physical movements. The unique value of Ling's work endures to this day.

Health in
Medieval
Europe

Broadly speaking, exercise is the functioning of any part. When we eat we exercise the salivary glands by creating a demand for their secretions. When we listen to music, or other sounds, we exercise the auditory mechanism located within the ears. When we read we exercise the eyes. When we think we exercise the brain and nerves. Thus the term *exercise* may be applied to use, function or activity of any part of the body. But as ordinarily employed the word carries the idea of voluntary muscular movements.

EXERCISE AND PHYSICAL CULTURE.—Exercise is not all that is to be learned about physical culture, as many persons imagine, although exercise is an important phase of it. *Action is the law of life*, and it is only because we all get some exercise in the course of our ordinary occupations that we are able to live at all.

Another common misconception regarding exercise is that it is a mere muscle-building procedure. That exercise does develop the muscles goes without saying, but such development is only one and not the most important of its results. It has, in fact, very far-reaching effects, influencing every organ and function of the body. Even the brain responds to it.

It is understood, even by those who have learned little of physiology, that new muscle-cells replace those broken down by exercise. It is recognized also that increased strength of

How Far
Does Exer-
cise Go?



PHOTOGRAPH EWING GALLOWAY

It is important to have exercise improve the flexibility, as well as the strength and endurance, of the body. This picture shows a cross-country race with French workmen as the participants.

muscle-cells results. Yet it is not generally understood that exercise has broader possibilities than merely to replace old muscle-cells with new and better ones. Man's physical fitness does not depend entirely on the condition of his cells.

Consider your body, if you will, beginning with your feet and their strong flexible arches. Between these feet and the head are many noiseless, important joints that insure an amazing degree of flexibility as well as strength. Man's upright posture puts him in a class entirely his own. There are other bipeds, but none in which the legs, the spinal column and the head are aligned vertically as in man. This matter of upright stature, indeed, may be said to have made possible man's commanding station in the world of living beings. By the free use of arms and hands, quite impossible to lower animals, his ability to fashion an implement and his capacity to build a structure have developed. His erect stature has played an important part in the use of the intellectual and other faculties that have made him ruler of the earth. His structural formation has been of great advantage to him in developing a sound mind in a sound body.

**Control of
Muscles**

One of the most important functions of exercise is to maintain the flexibility and the marvelous freedom of action possible to the human body in its erect position. By exercise, and exercise alone, can these joints and reinforcements maintain their normal degree of activity and strength.

Visualize for a moment a man or woman engaged in athletic activity. No matter what this activity may be, certain forms of movement are inevitable. The feet play their part always, whether on tip-toe to support the entire weight of the body, or held firmly to the earth in resistance or support. The knees dip and bend, or keep the legs braced. The hips support the upper body in maintaining an erect attitude under stress, or bend or twist at command of the will. The spine serves as the axis upon which the shoulders and the upper body turn. The arms that issue from the shoulders enable the hands to grasp, to seize, to cast, to strike, to hurl, to pull, to perform the innumerable offices of which only the human hand is capable. Of tremendous importance indeed is this bending, twisting and turning of the human structure. Flexibility and freedom of action stand foremost among the

qualities of youth and youthful qualities spell physical excellence no matter how old their possessor may be.

**Spinal
Region and
the Nerves**

In earlier editions of this work, the intangible, even mysterious 'source of bodily energy, the spinal cord, was likened to a dynamo supplying energy and activity to the human body—a dynamo powered by that most marvelous of all engines, the human heart. This was chiefly a figure of speech, it is true. Yet the fact remains that upon the strength and activity of the spinal region depends the efficiency of the nerves and the sympathetic nervous system in general, and, in turn, the efficiency of the brain which is, in essence, the human will upon which all accomplishment depends.

The effects of exercise upon the blood-stream, because of proper oxidation through deeper breathing, and the effects on the heart, the lungs and other organs, are of far-reaching importance. And to maintain strength and flexibility of the bodily structure and the stimulation of the spine is of great importance also. Pursuing further the idea of a mechanism,



PHOTOGRAPH KEYSTONE VIEW CO.

Wholesome competition serves a useful purpose in exercise, even in the early years of childhood.

we may consider the organs that circulate the blood through the body, plus those that replenish its vitality, as parts of the human motor. For the means of distributing the spark to operate this motor we have the sole living tissue that is built into the body's skeleton or chassis: the spinal cord and its extension, the brain. In the motor car the maintenance of the efficiency of the power-plant is an absolute essential. Strength, flexibility and durability of the chassis are likewise indispensable. Exercise and the intelligent pursuit of sports and games insure, not simply the efficiency of the human motor, but of the human chassis also.

Progressive
Physical
Develop-
ment

EXERCISE AND PHYSICAL DEVELOPMENT.—The first effect of progressive developmental exercise is not to develop the muscles, but to tear them down. Through the very fact, however, that it does use up the muscular-fibers it creates a demand for the production of more. Life is persistent, and when destruction threatens, added protection is provided, if this is at all possible. Hence, when exercise has torn down some of the muscle-cells, the life-force within the body not only replaces those cells but adds a few more as a safety margin. This rebuilding and extra production takes place during rest and sleep after exercise. This is the secret of development: *Use what you have and more will be given.* Then use some of that and still more will be given. It is the working out of the text, "To him that hath shall be given." The converse of this text is also true: "From him that hath not shall be taken away even that which he hath." If you use up practically all the energy and much of the delicate cell chemicals that you possess, there will not be enough capital left upon which to build, and instead of development there will be atrophy. Therefore be content to progress slowly. It is also important that after development is attained it must be maintained by continued moderate use. Athletes who give up their activities must not expect to remain as good as ever. Ordinary people seem to expect to maintain the health, strength and agility of youth almost up to old age, though they do little active physical work. Fortunately the amount of exercise needed to keep a part normal is always less than that required to develop it. Regardless of how busy we may think we are, we can find time for some exercise.



PHOTOGRAPH KEYSTONE VIEW CO.

The play spirit enters markedly into the profit, as well as pleasure, that the growing girl or boy attains in athletics. This photograph shows members of a swimming club at Ken Wood, London, ready for a plunge.

**Fatigue
Checks
Overwork**

FATIGUE.—In developing muscular power, or any other function, for that matter, there is an excellent natural check on our activities which normally prevents overdoing. This is fatigue. When fatigue is properly understood, it is easy to gauge the amount of activity that will produce the best results. Let us now consider the essential facts of this phenomenon.

We have already seen that exercise tears down the muscles. It also uses up the food material stored in the lymph spaces. Of these materials the part not consumed is changed into forms normally passed out through the eliminative organs, and

if anything interferes with this elimination we have fatigue. The waste matters therefore may be called "fatigue poisons."

**Fatigue
Poisons**

As an illustration of the way these poisons affect us, let us consider the case of the unpracticed runner. He soon begins to "lose his breath." This is because the exercise produces fatigue poisons so rapidly that the lungs, in order to perform the extra work thrown on them, have to breathe faster. As the runner continues this difficulty increases, until the heart pumps more blood to the lungs and the latter are able to speed up the elimination of the poisonous gas, carbon dioxide. When this happens the breathing becomes deeper, so that more air is accommodated, while the lung tissues become more efficient, bringing about a more rapid interchange and reestablishing the chemical balance of oxygen and carbon dioxide within the blood-stream. The production and elimination of the fatigue poisons then assumes a regular ratio or percentage, and the runner gets relief with what is known as his "second wind." If he continues running long enough, however, more and more of the waste matter accumulates and he again begins to get "out of wind." The lungs cannot eliminate the carbon dioxide as fast as it accumulates in the blood-stream. There can be no further physiological adjustment, so he has to breathe faster and faster. But even this is insufficient to eliminate the fatigue poisons, which then begin to interfere with nerve-action. The runner now begins to feel tired.

Fatigue, or tiredness, is therefore only a result of an accumulation of poisons in the body, because of the production of more of these substances than the eliminative organs can handle. If the runner now stops and rests, he will continue to breathe rapidly until the worst of the toxins have been thrown out and the balance of oxygen and carbon dioxide has been restored, when he will feel almost as well as ever. This "breathlessness" fatigue is called *acute fatigue*, and often it is very uncomfortable, but it soon passes off. Some of the general tired feeling may remain for several hours, or until after a night's sleep.

**What Is
Fatigue?**

If the runner forces himself to continue, however, until he practically drops from exhaustion, it will take longer for him to recuperate, possibly several days. In this case there will

remain, after the acute breathlessness passes off, general weariness, restlessness and disturbed sleep. It may also be found, immediately after the exercise, that the temperature has risen several degrees, while albumin and blood are passed in the urine. These symptoms are signs that the overtaxed body has been making vigorous efforts to throw off the fatigue poisons as fast as they accumulated, but has failed to meet the demand. The condition is much the same as an acute disease, in which the body develops a fever and other symptoms, and throws off the toxins that for weeks previously have accumulated as a result of wrong habits of living. This form of fatigue is really acute in many ways, but is called the *subacute* to distinguish it from the more acute stage of extreme breathlessness.

Causes of
"Staleness"

It has been noted that the second stage of fatigue was due to the interference of accumulated poisons with nerve action. They do this by poisoning the nerve-centers so that they are just as "tired" as the muscles, in fact more so, because it has been found that the muscles can still be stimulated to activity by electricity after the nerve action has practically ceased. This poisoning of the nerve-centers, if continued through repeated overexertion, with many subacute fatigue reactions, brings on a chronic fatigue that is known in the athletic world as *staleness*. The sufferer may not feel many of the subacute symptoms of fatigue, but he loses interest in exercise, has little appetite, may lose weight, and feels any kind of effort to be a burden. Temperature and blood-pressure may be subnormal. This chronic fatigue may require weeks for recovery. Not only is muscular rest required, but it may be necessary to bring about physiological rest by limiting the diet to fruit juices for several days and following with an easily digested but highly vital diet, such as milk, or milk with fresh fruits and vegetables. A change of surroundings is beneficial, and of course plenty of sleep is very necessary. The hygiene of sleep is important and is fully discussed at the close of Volume I.

There is one other cause of fatigue besides the accumulation of fatigue poisons. This is slackening of interest. Muscular movements depend upon nerve-action, and nerve-action depends not only upon energy and vitality, but upon

interest and attention. If one is interested in some form of work or exercise, one does not tire quickly, because the nerve-centers work better. This is why an amount of play requiring muscular exertion equal to that demanded by a certain piece of work, will not produce the same amount of fatigue.

If one is performing a light exercise such as opening and closing the fingers, the muscles will begin to feel tired before there is any possibility of a sufficient accumulation of fatigue poisons to produce breathlessness or inhibit



PHOTOGRAPH PACIFIC & ATLANTIC

Age in itself is not a bar to exercise and activity; it is the conditions that abnormally accompany age that are injurious. This is proved by Dr. Richard Hoyner of Boston, an active swimmer and athlete, at seventy-five years of age.

the nerve-centers. This fatigue comes mainly from failure of nerve-force; but if one makes an effort to focus the attention more fully upon the exercise, it can be continued for some time without much additional weariness in the muscles. Of course, in such a light exercise, the point where fatigue will force a halt will not be entirely determined by a general accumulation of broken-down cell-matter. Exhaustion of the nerve-center in this case is brought about by lack of nourishment, on account of fatigue poisons interfering with the circulation in the nerve-cells. Not only muscular action but also functional action of

**Fatigue and
Nerve
Centers**

any part of the body produces fatigue poisons, for the cell-structure of the flesh is one vast chemical laboratory of building up and breaking down.

The rapidity with which fatigue is produced by exercise will depend upon the general physical condition and the mental interest. The physical condition is, of course, determined by the habits of living. If one lives correctly, so that there is no accumulation of toxic material in the system, and so that the eliminative organs have not been overworked, but are able to stand considerable extra exertion, fatigue will be postponed much longer than if the contrary is the case.

Proper training will also do much to build up resistance to fatigue. The nerve-centers will be strengthened so that they do not tire so easily. In an untrained muscle only those cells nearest to the nerve-endings contract, so that even in a fully flexed muscle not all of the muscle-cells are contracted. Training increases the effective range of the nerve impulses, as well as the number of nerve-endings from which the impulses come. Consequently, in a well-trained muscle, practically all the cells contract when there is need for it, and a greater amount of work can be accomplished before fatigue supervenes.

Developing
Nerve
Centers

Fatigue may be further postponed by learning to breathe correctly, so that the lungs may work with their maximum efficiency; by learning to relax, so that there will be no unnecessary exertion, or any tension to interfere with circulation; and by learning to perform movements in the most economical manner. The novice is awkward and always uses more nervous energy in making movements than the expert who has developed coordination.

While employing all natural methods for postponing fatigue one should heed its warning when it does come. It is necessary to exercise to the point of moderate fatigue in order to secure development, or the maximum of physiological benefit, but it is not advisable to carry exercise to the point of subacute or chronic fatigue, especially the latter. Acute and subacute fatigue may be permitted occasionally in the athletic competition of thoroughly trained men, but chronic fatigue should always be avoided.

The function of fatigue is *to prevent strain and overwork*



PHOTOGRAPH UNDERWOOD & UNDERWOOD

PLATE 34. Young workmen of cosmopolitan nationalities, attending an American part-time school, exhibiting their skill at pyramid building.

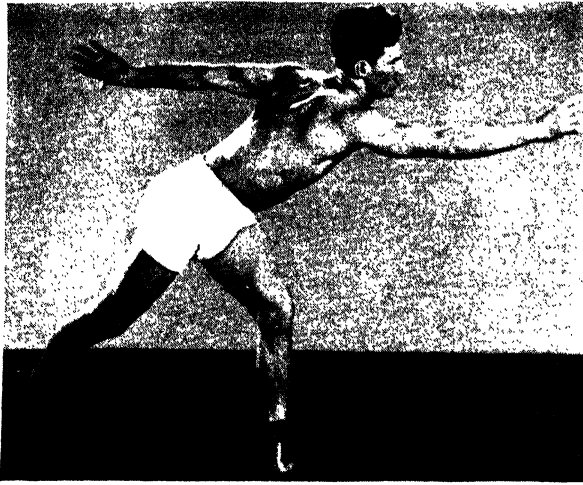
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of the muscles, nerve-cells and eliminative and other organs. If an effort is made to continue an exercise beyond the point of general fatigue, the body will collapse and the person become unconscious, thus forcing rest. Fatigue is therefore a safety-valve, and if properly heeded will enable one to graduate exercise in such a way as to bring about a greater and greater capacity for muscular exertion with less and less tendency to fatigue.

PHYSIOLOGICAL EFFECTS OF EXERCISE.—What happens when we move a muscle? Even with physiology overlooked observation tells us that the muscle swells. The swelling naturally produces pressure on the arteries and veins passing through the muscle and forces out the blood. When the muscle relaxes the pressure is relieved and new blood rushes in. Muscular contraction thus forces from the muscle involved waste products as part of the blood that is expelled from it. This blood passes on through the circulatory system to the excretory organs of the body. The relaxation of the muscle is followed by its absorption from the blood and lymph circulation of nutrient material to replace the waste products that have passed from it. It thus will be seen that muscular movement involving the larger groups of muscles in the body is a powerful stimulation of the general circulation.

New Blood
for Old

The acceleration of the circulation, however, depends not merely upon the mechanical effects of muscular movement, but upon the effects on the nervous system, glands, heart and lungs. As soon as the muscles begin to move, a demand is made upon the nerve-centers controlling that function for more blood to be sent to the parts. This is brought about in several ways. The vasomotor nerves, which control the muscles in the walls of the blood-vessels, cause them to relax more completely so that they may stretch and accommodate more blood. The nerves controlling the heart action cause that organ to beat more vigorously, so as to pump more blood. Increased lung action always accompanies increased heart action, and the mechanical movements of breathing definitely assist the circulation. As the exercise is continued and increased, demands are made on other organs in ways yet to be described; these organs also require more blood and the increased circulation soon becomes general.



In the shot-put, as this photograph in scant uniform shows, the back is the source of energy that propels the weight of the shot and the arm thrust.

All these factors acting upon the blood circulation have a similar effect upon the circulation of lymph. It will be remembered that the lymph is the liquid part of the blood which surrounds all the cells and is

the medium through which they are supplied with nourishment and relieved of waste products. The flow of the lymph is highly important, as it carries the finely dissolved food substances to the flesh cells, as well as carries away the waste-products to the eliminative organs, especially the lungs.

Exercise and the Lymph

Exercise, as we have seen, immediately increases the need for elimination, because of the waste-products which it causes to be thrown into the lymph and blood-stream. We have also seen that this produces adjustments to provide for the extra elimination. Let us now look at these adjustments in more detail.

The increased circulation induced by exercise stimulates all the organs to greater activity, including the eliminative organs, and the fatigue poisons, acting through the nerve-centers, stimulate the latter still further. The increased amount of blood sent to the lungs produces adjustments for the removal of the additional carbon dioxide from the exercised muscles. The heat generated by muscular exertion causes increased perspiration, to keep the temperature normal, and this perspiration is the vehicle for the elimination of urea and other waste-products. Urea is also excreted in increased amounts by the kidneys, which share in the general stimulation. Bowel elimination is increased because the muscular contrac-

tions massage the intestines, and the shifting about of the intestinal contents produces vibration. The deeper excursions of the diaphragm resulting from the deep breathing also help to stimulate bowel action. Thus it will be seen that the four great channels of elimination—the lungs, skin, kidneys and bowels—all show increased activity under the stimulus of exercise. External bathing is important for cleanliness, but nothing so cleanses the inside of the body as does active exercise except, possibly, fasting.

The organs concerned with digestion and assimilation are naturally stimulated to increased activity by exercise, as are the other organs in the body; but its effects upon nutrition are still deeper and more far-reaching. Not only does the accelerated circulation facilitate the distribution of food materials to the cells, but since more and better cells are built up to take the place of those destroyed, the appetite is increased and digestion is still further stimulated, so as to supply the needed building material. In addition, the mechanical movements of exercise, with the deep breathing which it induces, massage the glands, which are concerned in the function of digestion, such as the liver and pancreas, and this promotes greater activity in these parts. Thus, every factor or function which enters into the nutrition of the body is stimulated to greater and more efficient activity by exercise.

**Exercise and
Nutrition**

The chief further effect of exercise, as already noted, is to improve the structure of the muscles and of the individual cells, making them larger and stronger. The nutrition and elimination of the muscle are greatly accelerated, and the vigorous perfected cells produce less fatigue poisons during their activity than ordinary cells. More work can then be done by the muscle, and less is required of the eliminative organs.

These effects are not limited to the muscle-cells themselves, but extend to those of the connective tissue, which cover the muscle-fibers and groups of fibers and which form the tendons that attach the muscles to the bones. All these parts must be stronger in order to back up the increased strength of the muscle. If the muscle-coverings and tendons are weak, unusual exertion may cause rupture of parts of the muscle and tearing or partial detachment of the tendons from the bones.

Of course, such accidents may happen to the best developed individual, but as a rule they occur only when there is an unequal development, some parts being much stronger than others, so that when both are used together the strong strains, tears or breaks the weak.

Although the statement may seem far-fetched, muscular exercise actually strengthens the body's bony structures. This occurs not only indirectly, through the stimulating effect of increased circulation, but also directly, through the constantly increasing pull of the tendons. This pull calls, naturally, for more resistance on the part of the bones, and a further consequence is that the ligaments which hold the joints in place become stronger. They also become more flexible and elastic, so that the joints are permitted to move very freely without loss of security, and as the increased circulation causes an increased secretion of the synovial fluid, or lubricating medium of the joints, they move with less friction and loss of energy. All these various effects upon the muscles, tendons, ligaments and bones mean smoother, more graceful, better coordinated and more powerful action.

**Exercise and
Circulation**

The discussion of the influence of exercise upon the circulation has shown us, to some extent, the effects upon the heart and lungs. The heart is a muscle, and since it is exercised by exercise of the voluntary muscles, it naturally develops with them. Its pumping capacity is increased, partly because of its increased cell vigor, but also because of improved nervous control. The heart is an involuntary muscle which must keep beating from birth to death, and, according to observations made on the hearts of healthy young medical students at twenty-five years of age, it may do an amount of work equivalent to the lifting of fifty-six tons (the weight of a moderate sized locomotive) one foot high during every twenty-four hours.

The heart does this without conscious fatigue because of a number of factors, probably the most important of which is that the nerve-centers controlling its actions do not have to be trained for each individual, but inherit capacities developed through countless generations. These centers are thus in closer contact with the source of all life and action, and are not influenced by conscious thoughts of limitation. The

voluntary muscles and the nerve-centers controlling them have to be developed and trained for each individual, and are always limited by race and individual consciousness of human frailty.

The activity of the lungs goes hand in hand with that of the heart; for when the latter organ sends more blood to the lungs, they must be more active in order to purify quickly the vital fluid and allow it to return to the heart, thus preventing congestion in the lungs. Every one knows that as soon as one begins to exercise the heart beats faster and breathing is accelerated. This increased action naturally leads to increased development, and since breathing during exercise is not only more rapid but deeper, the flexibility of the lungs, as well as the size and number of the cells, is increased. At the same time there is an increase in the chest capacity, permitting greater expansion of the lung tissues. This increase in chest-capacity is brought about through development of the inter-costal (between the ribs) muscles and the diaphragm. As these muscles

**Exercise and
Elimination**

become capable of more powerful contractions the ribs are raised higher on inhalation and compressed more on exhalation, and the diaphragm makes wider excursions between the chest and abdomen, thus bringing about a greater difference between the size of the



The flexibility of the entire physique that is essential in handball involves the free movement and rotation of the spine as much as it calls into play the arms and hands of the player.

chest on inhalation and exhalation and a correspondingly greater interchange of air at each breath.

The other eliminative organs—the kidneys, bowels and skin—are only indirectly affected by exercise; but even so their increased function brings all the beneficial effects already enumerated as occurring in the other organs of the body. The profuse perspiration induced by vigorous exercise is sufficient proof of increased activity of the skin, and the more highly colored urine excreted after exercise shows that the kidneys have been eliminating broken-down cell-matter.

WHEN TO EXERCISE.—There is much more to exercise than merely moving the muscles in a haphazard manner, as the notion strikes us. Such unscientific movements may be better than none at all; but if we want the best and quickest results we must know, not only what exercises to take, but when and how to take them.

Among these results we should not, however, expect the cure of actual disease. People often ask what exercises they should take for catarrh, or enlarged liver, or kidney disease, or diabetes. One regrets having to disillusion these sufferers by telling them that there are no certain exercises which will cure them and that much more than exercise will be required; but general exercise taken in the proper manner will, nevertheless, do much to help them along. With conditions which are classed as deformities rather than diseases the situation is different. For spinal curvature, flat-foot, prolapsed organs, and so forth, certain exercises will naturally be more helpful than others.

All sorts of notions are prevalent as to when one should and should not exercise, but many of them are founded neither upon reason nor experience. The following recommendations may prove more useful than these superstitions.

Age and Exercises

It seems that many people still adhere to the old idea that exercise is necessary in childhood, but entirely unnecessary in adult life, or that it is beneficial up to middle age and harmful thereafter. These ideas are entirely illogical. If exercise is necessary at all, it is *always* necessary, because the processes of life do not differ much from birth to death. *Action is the law of life*; and as life is until death, so must action be. Exercise is merely muscular action and this is needed at all

ages, though certain kinds of muscular action will be more beneficial at one age than at another. Too much exercise, or the wrong kind of exercise, may be harmful at any age; but this is not the fault of exercise, *per se*, only of the manner of its use. Which again proves the importance of knowing when and how to exercise.

In babyhood special exercises are less important than at any other age, since the spontaneous movements of infancy provide for normal development. Under civilized conditions, however, we cannot depend entirely on Nature, and most babies would be benefited by play exercises properly given by parents.

The above rules apply almost equally well to childhood. Most children are interested in active games, and there is no better exercise for this period of life. However, as the child grows older he may develop too great an interest in books, or for various reasons he may develop an inferiority complex, so that he does not take sufficient interest in games to get all the exercise he needs. In such a case every effort should be made to induce him to play games. If this fails special general exercises should be given, much the same as would be used for an adult who does not get enough muscular activity. Those children who develop a great interest in one certain line of athletic activity, so that they wish to devote all their leisure time to it, should be given special exercises to develop those parts of the body not employed in their favorite form of athletics. Similarly, if the child seems to be lacking in development in any part of the body, special exercise can be taken for that part, even though there is considerable activity in games. In other words, prescribed exercises are necessary during childhood only in exceptional cases, but they are always permissible and may be used to some extent in place of games if there is a particular interest in them. Generally there are many advantages in having the children join a Y.M.C.A. or Y.W.C.A., or similar institution, at around twelve years of age, as they will then have an opportunity for quite varied activities under intelligent supervision.

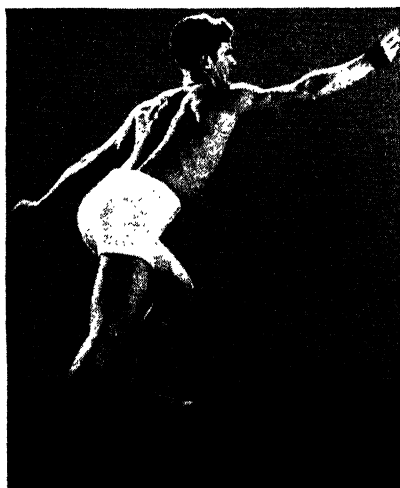
Exercise and
the Child

After the age of puberty the child begins to become more self-conscious, is inclined to put on a little dignity, and will not indulge to the same extent in active games. Also the

demands of education, and sometimes of earning a part or all of his living, consume so much of his time that there is little left for games. Games and walking are wonderful forms of exercise, but they do have the disadvantage of consuming a lot of time. In these cases it is well to start on a general regimen of exercise, not only for the immediate good resulting but to form a habit which is certain to be needed as the child develops farther into adulthood. Games and athletic competition, especially the latter, should be included whenever possible in this regimen; but they may have to be supplemented with calisthenics and gymnastics, and some cases may have to depend on the latter almost entirely.

**Effect of
Exercise on
Youth**

In due time the boy or girl will have some idea of the life work he or she wishes to follow, and will be in a position to choose the form of exercise best suited to individual need. Some special exercise almost certainly will be required at this period, unless the young person is training as an athletic instructor, or a specialist in boxing, tennis or some other sport. The exact kind employed will depend on the particular physical needs, the time available, the facilities at hand and other considerations. Young men and young women should have some games and competitive athletics, if at all possible,



In these photographs the unclothed back shows how actively the spinal region and back muscles are brought into play in ball-playing. The movements involved in pitching the ball are shown at the left; the climax of motion in batting is illustrated in the picture at the right.

together with free-hand calisthenics. If the games are not available the calisthenics should be amplified to include all varieties and whatever gymnastics can be arranged for. Young men desirous of developing unusual muscular power can take developmental exercises with apparatus of various kinds. Usually exercise should be taken with the idea of maintaining or improving the health rather than for mere strength development, but the latter has its advantages.

During middle life, or from forty to sixty years of age, most persons think they are about ready to be excused from exercise. This is where they make a mistake. Most of the functions of the body tend to slow down as the period of growth and development passes, and therefore the stimulating effect of exercise is needed all the more. At the same time physical activity has usually been reduced to a minimum. At forty most people have arrived at the point where they direct the activities of others and hence do not get much activity themselves. Their interests are now chiefly business and the home, and they give little if any time to games or even walking. Some allow themselves to become so wrapped up in other interests that they imagine they do not have time for exercise. This reduction in activity, which is usually coupled with the eating of too much rich food, soon results in poor circulation, general sluggishness, stagnation in various parts of the body, stiffness, aches and pains and chronic diseases. A little exercise would prevent many of these conditions, not only because of the general stimulation of function, but because regular exercise maintains interest in the physical condition and more attention is likely to be given to other health matters.

After 40
What
Exercises?

One who is seldom called upon to perform any muscular work does not realize how he is retrograding until he attempts to do something which was formerly easy, and finds it very difficult if not impossible. Men who have been athletes in their youth, but who have made the mistake of avoiding exercise "after forty," have frequently strained themselves quite severely in attempting "stunts" that in the past were easy. There is no reason why a man past forty should not exercise. He does not need to indulge in strenuous competition, or take heavy gymnastic work, but he should take general calisthenics and such of the lighter games as are available, including golf,

volley-ball and handball. Walking is particularly important at this time and should always be included with the other exercise. If one has the time to take quite long walks and will travel at a good pace, this form of exercise will be all that is really necessary, though a more balanced development and more organic stimulation might be obtained by the addition of at least some calisthenics. The latter will usually be the form of exercise that will have to be depended upon, because few men are in a position to spend three or four hours a day in walking.

The idea that the heart, or the arteries, or something else, will not stand exercise after forty is largely a superstition. *The condition of the organs is not so much a matter of years as of the habits of living*, and exercises taken regularly from youth to old age will do much to keep them in good condition. Of course, if exercise has been discontinued entirely for a number of years, it will be necessary to start gradually; but this is a rule that applies at any age.

It is not necessary that a great amount of time be expended in exercise at this period, but a little time given to the right kind of exercise means adding years and vigor to one's life. Do not let anyone persuade you that the contrary is the case, and that the energy used in taking exercise is just so much subtracted from life's capital and will hence shorten life.

Amount of
Exercise

As for the period beyond sixty, each person will be, largely, a law unto himself. Some can continue fairly strenuous exercise while others will have to slow down. Some form of activity will certainly be required, but most people will solve the problem with walking, or golf, or both. At this stage the purpose of the exercise is merely to keep the circulation active and thus avoid stagnation and imperfect nutrition, or in other words to give the clock a little gentle winding at regular intervals.

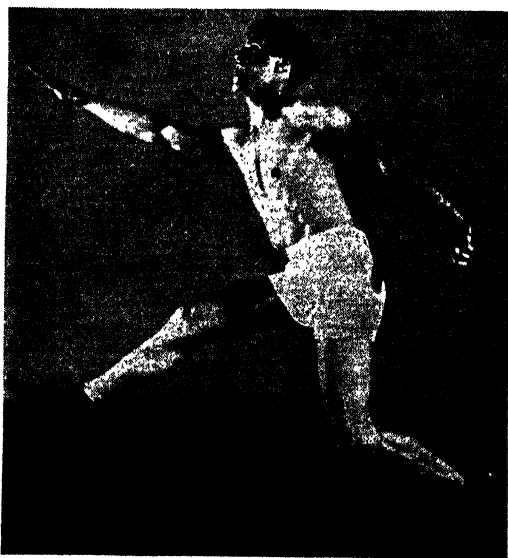
While somewhat definite limits have been set to the various exercise periods of life, it should not be concluded that habits of exercise are to be changed on certain birthdays. People are not all alike, some being old at forty and some young at sixty. Much depends on the habits of living previous to these ages; also upon the individual type. Each one will have to determine for himself just which plan of exercise best suits

his needs, but with the information given in these volumes it should not be difficult to do this. Exercise is never contraindicated unless there is some abnormal condition present, and not always then.

As to whether women should exercise during menstruation, pregnancy and lactation, that depends on circumstances. These are physiological, not pathological conditions, and do not in themselves contraindicate exercise. Some modification of exercise may be required during these periods, especially during menstruation and the later weeks of pregnancy; but it should not be discontinued entirely, except during the actual period of childbirth and a few days thereafter while the reparative processes are going on. Proper exercise during pregnancy will do much to prevent abnormal symptoms and bring about an easy birth, and proper exercise during lactation will help to restore the figure to normal, as well as to maintain the general health. However, it is a lamentable fact that few women are perfectly normal in their reproductive activities, so that more modification of the exercise regimen than is here indicated may be required for the majority. For this reason, and because many people have an idea that exercise for women should be quite different from that for men, the subject has been taken up in a special section. The exercises indicated or contraindicated for actual pathological conditions associated with the reproductive organs will be found in Volume IV.

There has been from time to time a considerable amount of discussion as to the best time to take exercise. Since we

**Exercise and
Motherhood**



In this attempt to portray the action of going over hurdles, spinal activity is illustrated to a noticeable degree.

are all more or less active all day, we are constantly getting some exercise; but in the case of special movements taken for a particular purpose, authorities are now fairly agreed that the middle of the afternoon is the ideal time. This does not apply to walking, unless walking is the only exercise being used. In most cases walking may be taken at any time desired, or whenever it is convenient.

**Exercise in
Afternoon**

Unfortunately most people are not in a position to stop work in the middle of the afternoon to take their exercise. Most business concerns are not yet cognizant of the fact that a few minutes' exercise in the afternoon increases the efficiency of their employees more than enough to make up for the loss of time. Housewives and children can take their exercise in the afternoon, but most working people will have to choose another time. This need not cause them to be disturbed, or to think that they will not secure satisfactory results, for properly graduated exercise may be taken with benefit at almost any time of the day not too close to meal-time.

Probably the next most favorable time for exercise is in the morning immediately after rising. At this time the body is fresh from a night's sleep and one often feels more like exercising. Activity at this time gives the bodily functions a good start for the day and makes one feel more like work. The exercise also serves the purpose of increasing the circulation in preparation for the morning cool bath which (properly taken) should be a part of every health regimen.

**Exercise in
Morning**

Morning exercises should start gradually in order to give the heart an opportunity to speed up a little at a time. The heart has slowed down considerably during the night, and to suddenly demand considerable extra work from it will tend to produce dilation and strain. It is always well to precede any exercise period with some deep breathing, so as to stimulate both heart and lung action. One should begin with light muscular movements and proceed progressively to more vigorous ones. This is true at any time, but especially when exercising first thing in the morning, as it enables one to judge better how much can be done without undue fatigue. If one exercises to the point where considerable fatigue is felt, there will not be enough energy left for the day's work, unless there is time for a rest period between the exercise and the

work. As the time remaining is usually short and part of it is consumed in eating breakfast, involving energy of another sort, it can readily be seen that it is best to limit the morning exercise to just what is needed for physiological benefit. In this case there will not be much danger of interfering either with the business of the day or with the digestion of breakfast, as this is not usually a heavy meal. If more exercise is desired, it can be taken in the evening.

If neither the morning nor afternoon are convenient for exercise, the time most likely to be employed is in the evening before retiring. This time, like the others, has its advantages and disadvantages. There is the advantage that one can retire and rest immediately after the exercise, which is very good. Also, since the day's work has been done, one knows how much energy is left to expend on exercise and there will be less likelihood of overdoing. However, there is no very serious danger of this at any time of the day, as most people are inclined to exercise too little rather than too much.

Exercise at
Night

One disadvantage of exercising at night is that it is seldom possible to allow a sufficient interval between the exercise and the evening meal, which is generally a heavy one. Another is that one may feel tired and disinclined to any further exertion. If this fatigue is real it is better to rest than to exercise, especially if one has eaten a full dinner. Of course, if very tired from the day's work, it would be better not to eat the full dinner, or at least not until some rest has been taken. But if the fatigue is only the result of overeating during the day, insufficient fresh air and retarded circulation due to a sedentary occupation, the increased circulation induced by exercise will banish it.

If the day's work that is generally performed



The more strenuous forms of dancing provide excellent examples of the activity of the spinal region, as well as the arms and legs, with incidental rotation of the body above the waist.

nowadays produces marked fatigue, there is usually toxemia present and appropriate treatment should be taken before adopting general exercise. It is possible to distinguish the apparent from the real fatigue by the fact that the former disappears with exercise, while the latter increases. It can also be identified without this test by a consideration of the amount and kind of work done during the day. If it has been greater than usual, or of such a nature as to lead one to reasonably expect to be considerably fatigued afterward, then one may assume that the tired feeling is genuine. Even in this case, however, it is a good thing to take a few stretching exercises. If one's habits of living are regular and a little common sense is used, it is quite possible to exercise at night with benefit if unable to arrange to do so in the morning or afternoon.

Exercising
Twice Daily

The majority of working people who have the conventional working hours will have to adopt the plan of taking their exercises in the morning, adding some in the evening if the condition permits, or if they desire to develop unusual strength.

It is not advisable to exercise close to the meal-time. At least half an hour—or better, an hour—should elapse after vigorous exercise before food is taken. After a full meal at least one hour—and better two or three—should elapse before exercise is taken. Eating creates a demand for blood in the digestive organs and for nervous energy to operate the organs and glands; and if one takes much exercise while digestion is going on, some of the blood must be diverted to the muscles and an extra amount of nervous energy will be required. This results both in imperfect digestion and in delayed recuperation from the exercise. The body works best when permitted to complete one major task before another is given it.

These precautions apply chiefly to vigorous exercise in relation to full meals. There is no objection to a walk, a game of golf, or other light exercise, after a small meal such as milk and fruit, soup and salad, or fruit alone. These articles are easy to digest, and the light exercise will not create sufficient demand for blood and energy to cut short the supply needed by the digestive organs. Neither is there any special objection to eating within a few minutes after light exercise. Such activity has not brought about so much destruction of

tissue that it cannot be restored even while the digestive organs are moderately active. Individuals will have to be guided somewhat by their own reactions, however, and whenever in doubt it is best to adhere to the rules laid down for vigorous exercise and full meals, regardless of the amount of exercise and food taken.

Because certain animals usually go to sleep after eating it is often claimed that a meal should always be followed by complete rest. This may be advisable for sick people, but most experience has not proved it necessary for those in good health. The wild animals do not eat regularly, so that when they get a chance they gorge themselves to capacity. Naturally, then, all the bodily forces must be concentrated upon the task of digestion. If one eats to repletion it is best to rest for an hour or so afterward, but then one should never eat to repletion. After a reasonably full meal, if one can devote some time to cheerful conversation, with more or less laughing, before undertaking any muscular exertion, it will aid digestion. There is no objection, however, to the housewife's doing the necessary post-meal work with the dishes, or to the husband's helping her. One should not develop the state of mind in which one is afraid to make a movement after eating for fear of disturbing digestion.

**Why Rest
After Eating?**

Many people have the idea that one should exercise every day religiously, but it may be better to omit exercise occasionally for a day. This gives the body a little time for recuperation. Reasonable regularity is sufficient in most cases. On the other hand one must not allow these "days off" to gradually increase in number, nor should an effort be made to make up for days lost by taking more exercise on other days. Too much some days and not enough on others will be harmful rather than helpful. Regular, reasonable employment of all the larger groups of muscles is the ideal to keep in mind.

Important as exercise is there are times when we should not take it. Since it tears down tissue it is capable of becoming as destructive as it is constructive when properly used. One should never exercise when acutely ill. At this time the body is loaded with poisons and at the same time nervously depleted, so that all available energy is needed to carry on the extraordinary eliminative processes which we call disease.



A strong, flexible spine is a most important adjunct to the physical equipment of every dancer.

**"Stop!"
Signals in
Exercise**

Moreover, the vital functions have been sufficiently stimulated to increased action without the assistance of exercise. Generally there will be no inclination to exercise, because of the uncomfortable symptoms, and if the disease continues long enough there may be so much weakness and prostration as to make activity impossible. Then one must wait until the acute symptoms subside, after which exercise must be resumed very gradually.

Another time when exercise should be avoided is when it causes pain. Pain may be considered Nature's "Stop!" signal. It indicates that something is wrong, and if it is acute, the movements should be discontinued till the cause has been found and removed. As a rule, exercise will not cause pain unless there is inflammation, and this is

equivalent to a local acute disease. There are a few conditions, however, in which pain indicates, not entire avoidance of exercise, but merely modification of it. For instance, if one has taken exercise to which one is not accustomed, so that soreness results on the following day, the repetition of the exercises will give rise to pain. If this is not acute the exercise may be continued, carefully avoiding all strain, and as the circulation is accelerated the soreness will decrease. If it is acute, however, it will be better to avoid active exercise and substitute passive exercise in the form of massage. This works the fatigue

poisons out of the muscles and relieves the pain sufficiently so that active movements can be resumed after a day or two. The painful stiffness and soreness of the muscles of the upper leg, from knee to hip, known among athletes as "Charley Horse," can best be treated in this manner.

Another painful condition in which exercise is not completely contraindicated is in the stretching of muscles and ligaments which have been shortened, as a result of strain or sprain. Even after the torn parts have healed, exercise, when resumed, will cause pain by stretching of the scar-tissue. By graduating the movements so as to stretch the parts a little at a time, normal mobility will soon be restored, though some pain may be experienced in the process.

Somewhat the same conditions obtain in cases of chronic inflammation of the joints, with bony deposits. The time arrives when the inflammation is almost gone, but the joints are stiff and the circulation impeded. At this time exercise will increase the mobility and assist in preventing the formation of further bony deposits, though it will cause more or less pain. In these cases it is well to start with massage and other passive movements, taking up the active movements after there has been some improvement.

Passive
Exercise

One should not exercise when already tired. As previously pointed out, it is necessary to distinguish between genuine fatigue and a toxic lethargy; but if one is really fatigued, rest and not exercise is needed. After the rest exercise will be necessary in order to develop more strength, so that one will not tire so easily; but this exercise will be effective only if balanced by adequate rest. Exercise and rest always go hand in hand. When the muscular system goes "stale," as athletes say in referring to the condition of lassitude that results from sustained training, the advice here given always applies.

Nervous depletion also forbids exercise until there has been some improvement, though all except the extreme cases can walk in moderation. Nervous depletion indicates that all the organs of the body are tired from overwork, and naturally they must have rest before they can be benefited by exercise.

There are certain chronic diseased conditions in which exercise must be used with discretion. These include tubercu-

losis, dropsy, severe heart-disease or very high blood-pressure, gastric and intestinal ulcers and polyneuritis. Yet even in these conditions there comes a time when exercise is very necessary if the patient is to make further progress. It is only at first, while the body is being cleansed, structural losses restored as far as possible, and a reserve of energy accumulated, that exercise should not be used.

In practically all cases of injury, except when the damage is very slight, one should not exercise until healing is well started.

The kind of exercise for each of us, also the amount and the method of execution, are indicated by the age, sex, occupation, condition of health and results desired. Children can take practically any of the calisthenic movements employed by adults and at certain ages some of the gymnastics and competitive sports, but these should be performed mostly in the spirit of play. We are particularly interested here in exercises for adults that replace childhood's play and at the same time produce better health, a more symmetrical development and a better control of the muscles.

KINDS OF EXERCISE.—There are three main groups of exercise—constitutional, developmental and corrective. Each will be fully discussed in its place, but the general purpose and use of each group will be indicated here so that the reader may get some idea as to the kind which should have his first attention. Every one will need some from the first two groups and quite a number will require movements from the third group; but all who are not accustomed to exercise should start with the first group.

Constitutional and Developmental Exercises

Constitutional exercise is the term given to those forms of muscular activity which are chiefly designed to strengthen the vital organs and increase their activity. These exercises do not require great effort, but they have far-reaching effects. They can be used by young and old of either sex and practically regardless of occupation. Included in this group of exercises are free-hand calisthenics, walking, the lighter games, deep breathing, dancing, singing and similar activities.

Developmental exercises are designed primarily to develop bulk of muscle, either for strength or simply to improve the appearance. They are seldom absolutely necessary, but most

people can employ some of them to advantage, for a little extra strength and a little better appearance are results not to be despised. Included in this group are exercises with apparatus, resistance and tensing exercises, lifting and the heavier games.

Corrective exercises are developmental in nature but are designed primarily and chiefly to overcome specific defects in structure,

such as spinal curvature, pigeon-breast, bow-legs, knock-knees and flatfoot.

The occupation determines, to a considerable extent, the kind of exercise that should be used. For instance, if the occupation requires one to be on the feet for long periods of time, the daily exercises may be taken in a reclining position; if the work is heavy the exercise should be light, and vice versa; if the work uses chiefly the arms, exercises should be selected that will develop the trunk and legs; if the occupation is sedentary, so that very little muscular movement is required, all kinds of exercise should be taken; and if the work involves considerable nervous strain, the lighter exercises, memorized so that they can be done almost automatically, would be indicated.

There are any number of occupations, each one presenting its own peculiarities and many making quite diversified demands on the muscles; but if one will remember that the additional exercise should be supplementary in character,



Accurate football-kicking is not a simple matter. In this instance the leg is not sufficiently straightened and the foot not brought up as freely as correct form demands. Yet, it illustrates the degree to which the back muscles take part in this strenuous action.

**Exercises
Supplementary
to Work**

ordinary common sense should indicate the movements required. However, common sense is not so common as it might be. Therefore the particular value of all the various exercises and exercise groups which are described in detail in subsequent pages is indicated.

**Constructive
and
Destructive
Exercises**

The condition of health always takes precedence of every other consideration in choosing one's exercise. The occupation may be light, thus indicating heavy exercise; but if the health is poor it will be necessary to limit oneself to light exercise until there has been definite improvement. Or if the work is heavy, thus indicating light exercise, it may be necessary to rest entirely for a time so as to allow the body to recuperate. If the patient is quite young, thus indicating play, but also has a deformity of some kind, corrective exercise will have to be added. If a young man is desirous of developing great strength and has been taking heavy exercise, but is injured or develops some disease because he has not been living rightly in other respects, he will have to discontinue the heavy movements for a time and be satisfied to rest, or to take nothing more than light exercise.

Generally speaking, anyone not in the best of health should limit himself to constitutional exercise or, in some cases, should stop exercise entirely for a time. In deformities which at the same time interfere with health the corrective exercises indicated should be taken in so far as the condition permits. There are few abnormal states in which complete cessation of exercise is required.

HOW TO EXERCISE.—The factors governing the selection of exercise govern also the amount. There are certain general rules which can be followed with safety in all cases except, of course, those in which exercise is completely contraindicated.

The first rule is to start with an amount that is easy to perform. Starting with a large amount in an effort to secure quick results will only end in disappointment. The first thing that happens is excessive soreness, which may necessitate rest for a few days and is always discouraging. Then there is the possibility of sprain or strain of muscles and ligaments, or overwork of the heart, with resulting dilation. There is seldom any permanent bad effect from these "accidents" except in the very young or the very old, but nevertheless it

is well to be on the safe side. Finally, and most important of all, if so much of one's available surplus of energy is expended in taking a lot of exercise all at once that none is left for recuperation, the exercise will be destructive instead of constructive. After all, the ultimate purpose of exercise is to bring about permanent bodily health and the mental attitude that invariably accompanies a sound body.

The second rule is to advance gradually. Having started with the proper amount, be content to increase it slowly. Rome was not built in a day and neither can your body be. A too rapid increase in the amount of exercise is open to the same objections as starting with too large an amount. We usually know how much we can do easily, so that it is not so difficult to determine the exact amount to start with; but it is not so easy to be sure of the rapidity of the progression. The proper plan is to err on the safe side. To advance somewhat more slowly than one might will do no real harm, while to advance too rapidly might lead to a setback from which it would take some time to recuperate. It is seldom advisable to increase the amount of exercise oftener than once

Gradual
Increase in
Exercise



Limbering up exercises with medicine-ball. In these exercises, the medicine-ball is used to increase resistance and attain more marked effect in the back.

1. Take the medicine-ball in both hands and swing it around at arm's length in large circles, as here illustrated. This is excellent for the spine.
2. Another method of swinging a medicine-ball, performed by circling with the body from the waist up while holding the ball at arm's length. This is a very effective spinal exercise.

a week, and the amount of increase each time should be determined by the rule applied to the start; that is, add an amount that can be done easily. If these rules are adhered to one will be surprised at the progress made as the weeks roll round. It has already been suggested that the ordinary routine of exercise should be omitted one day a week. This acts as a further check on overdoing.

It must not be forgotten, however, that there is a possibility of underdoing as well as overdoing. This mistake can be readily discovered by lack of progress. If one is not developing steadily in strength and to some extent in bulk or wiriness of muscle, and this is not due to wasting one's energy in other ways, then it is safe to try increasing the amount of exercise a little more rapidly. A certain amount of experimentation may be necessary.

The ordinary person who has no definite disease but has not been taking exercise can generally start with a five-minute period, varying the movements at each period as desired. Some may wish to concentrate on a few movements, varying them from day to day, while others may prefer a larger variety each time. The rate of speed with which the movements are performed and the duration of the pause between movements will determine the amount of muscular exertion in a definite period of exercise; but if one has to go slowly and rest considerably between movements, that is all the more reason for starting with only five minutes, while a stronger person who can exercise rapidly will be surprised to find how much can be done in that time.

Twenty-
Minute
Exercise
Periods

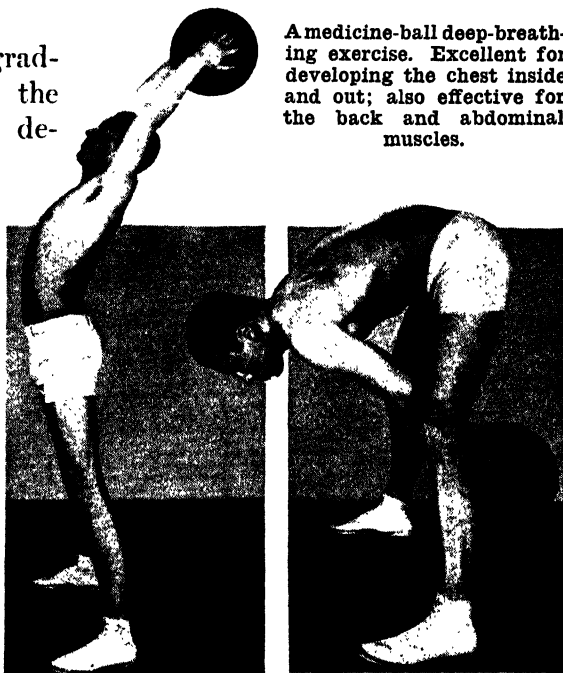
The time can be increased two minutes every week up to 20 minutes. This is all that will be essential, but one can continue to increase up to an hour, if desired, or even more if part of the exercise is in the form of games. It all depends on the time available and the ends in view. For the actual physiological needs, twenty minutes of carefully chosen and properly performed movements should be sufficient. The rate at which the exercise time is increased may be made faster or slower if conditions seem to indicate that it would be desirable. It may be made faster if the individual feels like doing more after each period, or slower if too great fatigue is experienced. One should not exercise to the point where

the muscles tremble afterward. This symptom will help to indicate whether more than twenty minutes a day should be taken. If special development is desired, however, it may be permissible to take two twenty-minute periods a day, even though one forty-minute period might seem too much. As long as there is full recuperation after a night's sleep one will be guarded against doing too much, and if definite progress is being made one may be assured that one is doing enough. The desirability of omitting a program of the heavier exercises one or two days a week has already been mentioned, but those taking only light stretching and relaxing movements, on account of doing heavy work, may continue them daily for the same length of time as is devoted by others to heavier exercises. Persons in this class may also use the lighter games, as long as excessive fatigue is avoided.

**"Special"
Exercises**

In addition to gradually increasing the length of time devoted to muscular activity and development the resistance of the movements should be increased. It has already been noted that each exercise period should be started with the lighter movements, the heavier ones being done toward the end, and the same form of progression should be observed from week to week. The lighter movements are, of course, those of the arm,

A medicine-ball deep-breathing exercise. Excellent for developing the chest inside and out; also effective for the back and abdominal muscles.



Bring the ball up from in front of the body to the overhead position illustrated, at the same time taking a deep breath. Then slowly swing the ball downward between the legs as here shown, exhaling completely during the downward movement. Fill the lungs again as the ball is swung up once more to position shown at the left. This deep breathing exercise is a most effective means of promoting strength and flexibility of the muscles of the back.

neck and shoulder, the trunk and leg exercises requiring more exertion. Movements taken in the reclining position require more exertion than those taken standing. Then there are various special positions, still more strenuous, which will be described in more detail, with illustrations, in the ensuing sections. The particular exercises marking the point of maximum exertion will vary in different cases, not only with the natural strength and limitations of development, but with the ends desired. For purely physiological benefit it is not necessary to go beyond the better-known movements taken in the standing and reclining positions. Special positions and apparatus are for those who desire great strength and unusual development.

Technique
of Exercise

It is just as important, and in some respects more so, to perform one's exercise in the proper manner, as it is to choose the proper kind and amount of exercise and to take it at the proper time of the day. Exercising in a careless and haphazard manner will never produce results. Many people who become partly convinced of the value of exercise force themselves to hurry through a few light movements every morning, and then when they do not secure results they say that exercise is a failure. To see some people exercising, one would think, from their position, expression and general actions, that they were writhing in pain. When exercise is done in the right way it is smooth, easy, graceful and a pleasure both to the participant and to onlookers.

The first essential for producing these desirable effects is proper posture. The body tends to assume at rest the position taken during exercise; so if one allows oneself to be careless of posture while exercising, spinal curvatures and prolapsus of the abdominal or pelvic organs will be likely to develop. The first thing taught the gymnastic student is how to hold himself correctly. The body must be erect, but there must be no stiffness or strain. An exaggeration of the erect posture is as bad as slumping. There are a number of methods of getting the proper upright position. Two of the best are as follows: (1) Stand with the back against a wall so that the calves, buttocks, shoulders and back of head all touch it. This will draw the shoulders back and keep the head up. (2) Raise both arms high overhead and then, while holding the position

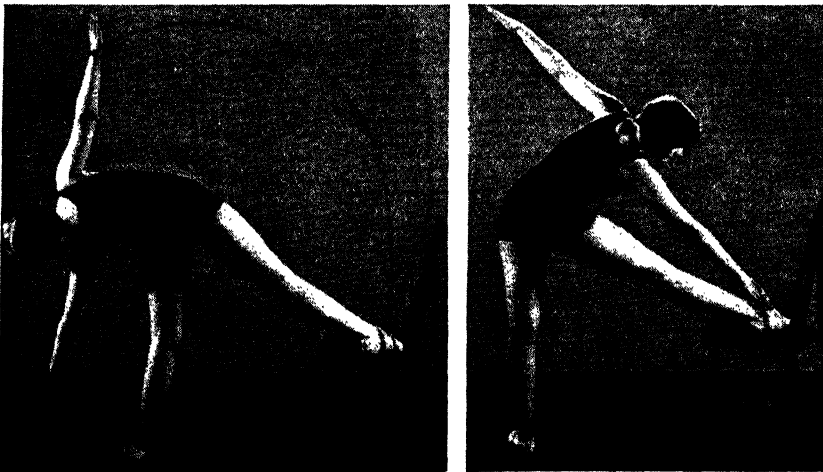
of the back which is thus assumed, lower the arms. This lifts the chest and throws the shoulders back so that the head position takes care of itself. Probably the most important single point to observe is to keep the chest up.

The placing of the feet is also important. It was formerly taught that one should stand with the heels together and the toes turned outward. It is now generally agreed, however, that the position with feet separated four to six inches, as seems natural, and almost parallel (toes turned only slightly outward) is to be preferred. The arms are allowed to hang at the sides in a relaxed condition.

Natural
Position of
the Feet

The position indicated—head up, shoulders back, arms loose and feet slightly separated—is the fundamental starting posture. From this position many kinds of movements are made, and at the conclusion of each exercise the body returns to it. For certain exercises, however, it may be necessary to change the position of the arms and legs to some extent before starting the movement. When taking exercises lying down the same position is assumed.

Having assumed the proper starting position, be sure to carry out each movement with precision. If the arms are to be flexed they should be bent as far as possible; if they



The "hip-pivot" for promoting spinal flexibility. Place one foot on a chair or other suitable object and with arms outspread, bend to the left to touch floor with fingers. Then bend to the right to touch the right foot, as illustrated in second photograph. The body may be turned at the waist with a circling motion from the waist up to increase the effects of exercise.



Typical example of spinal rotation in athletic sports. The movement of the body in such games as tennis and squash is suggested by this photograph. Such games and sports greatly improve spinal flexibility.

are to be extended they should be straightened to the fullest extent that the joint limitations will permit. In bending the body to the side, front or back, it should be bent as far as possible, unless special instructions for the exercise indicate otherwise. When raising the heels one should go all the way up. In other words, each movement should be carried to the fullest possible extent in order to secure the greatest flexibility of the joints and muscles and the maximum physiological benefit.

Though precision is necessary the movements should not be performed with too much of a jerk. Each action should flow smoothly into the next one, but there should be a little extra pull on the muscles at each flexion and extension in order to be sure that the movement is carried as far as possible. There are a number of fine points in the execution of exercises that are not so essential as the foregoing. These will be considered in detail in the section on *Gymnasium Class Work*.

Speed and Exercise

The speed with which the exercises are performed is important. It should never be so fast as to interfere with proper execution or to cause tenseness, but neither should it be so slow that the attention wanders and the movements are carelessly performed. Trying to do exercises rapidly will result in their being slighted, and there will be too great an expenditure of nervous energy for the physiological benefits received. The lighter movements can be taken more rapidly than the heavier ones, and if each movement is performed at the rate of speed that seems natural one will not go far wrong.

Counting while exercising helps to regulate the speed, punctuates or emphasizes each movement, and keeps the at-

tention from wandering. The method of counting may be arranged to suit the individual. Some prefer to count 1-2, 1-2; others like 1-2-3-4, 1-2-3-4; and still others count according to the number of repetitions. For instance, if they are performing a two-count exercise ten times they will count up to twenty. Of course, some exercises are naturally two-count, four-count or eight-count exercises and should be so performed. Bending the head forward and backward would be a two-count exercise, while flexing the arms, extending them overhead, flexing again and returning to position would be a four-count movement. Only those exercises combining movements by several different parts of the body are eight-count exercises. The proper number of counts for each exercise may be determined by consulting the caption under the illustration. A little thought will soon enable anyone to figure out the proper number of counts even without this assistance. If one exercises to music—and where there is a radio it is usually possible to tune in on an “exercise hour”—this will to some extent take the place of counting, especially if one has a good sense of rhythm; but if this is lacking, or in any case when desired, the counting may be used.

It is well to vary the movements, not only to avoid monotony but also in order that all the different muscles may be used, or the same muscles in different ways. Many people start exercising enthusiastically, but after they have become well acquainted with the movements they first learned they lose interest and begin to backslide. There is almost an infinite variety of exercises, however, and there is no excuse for monotony. Different movements can be used each day if desired, but in most cases it will be found that a change once a week will be sufficient. Another good plan is to alternate two sets for a month and then change both. One will be surprised to learn how a change in the direction or speed of an exercise, or a slight shift in the balance of the body will affect different fibers in a given muscle, so that, while it had previously appeared to be well developed and flexible, it may be rendered sore and stiff. This shows the importance of varying one's exercises.

Another method of varying one's muscular activities is to change the form of exercise entirely every so often. One

may take calisthenics for a month, then shift to games requiring considerable speed and strength, then to those requiring skill, then to swimming, then to some sport such as wrestling, then back to calisthenics and so on. Whether or not this plan is adhered to as a regular thing it is well to make a complete change once or twice a year. One can do this while on vacation. The change should be to some form of exercise quite different from that usually employed. If one has been accustomed to calisthenics and gymnastics, a change to hiking, camping and boating would be beneficial. If one has been getting one's exercise in the form of sports and games, a change to systematic gymnastic movements would be helpful. Sometimes it is well to take a complete rest for a time, except for walking. This is seldom necessary for normal individuals, unless they have been overworking; but if one has been taking quite vigorous all-round exercise for some time a rest will do no harm, even though not especially indicated.

**Concentra-
tion in
Exercise**

In order to get the best results from whatever kind and amount of exercise is being used the mind must be kept on the business in hand. If a group of exercises is learned and practiced until they can be done automatically, so that the mind wanders to other things while they are being performed, they will not be as beneficial as if the mind were concentrated on each movement. By concentrating on the movement it is not meant that there should be any mental strain or any tension of opposing or related muscles, but merely that the muscles being used should be kept constantly under conscious control, the idea of complete flexion being held as they are flexed and complete relaxation as they are allowed to extend. Such conscious control helps to develop the motor centers in the brain, so that they are not so subject to fatigue, and also to improve coordination, which, in turn, results in more graceful and perfect technique.

If an effort is being made to develop some certain part of the body the good effects of mental concentration on the exercises, including the associated rhythm of breathing, will be still more marked. In fact, there are adepts in the use of the mind who can produce a considerable degree of development in a muscle without actual exercise by mental influence alone. There is no special advantage in being able to do this,

however, as it takes about as much time and nerve-energy as development through muscular exercise; but it illustrates the importance of keeping one's mind on the business in hand when doing daily exercises.

In practicing this concentration it is important to avoid tension. Tension causes the loss of a tremendous amount of nervous energy every day. When muscles are not being used they should be kept relaxed, because even a slight tension consumes energy. Observe the relaxed movements of that little household animal, the cat, while it is getting ready to spring.

**Tension in
Exercise**

The greater and more extensive the tension the greater the loss of energy. A weight-thrower who concentrates all his effort into a very short space of time, while he is making the three turns and the throw, tenses practically all the muscles in his body. Even the thorax is immobilized and breathing is temporarily suspended. He thus uses as much energy in a minute as one would in thirty minutes or more of calisthenic exercises. In doing any exercise all muscles not actually involved in the movements should be kept relaxed. The right kind of concentration will help here, for it will withdraw the mind from the muscles not being used.



For limbering up and stretching. The extension and stretching of the body as it affects the spine in running exercises is here illustrated.

Rest Periods

In addition to the relaxation of the muscles not being used during movements, there should be a short period of quite complete relaxation after each exercise. This permits a brief change of thought and allows the blood to flow freely through the muscles which have been used. At the same time this brief rest equalizes the general circulation and permits elimination through the lungs and skin to catch up with the accumulation of fatigue poisons in the blood. If one has any special difficulty in relaxing it would be well to practice the relaxation exercises described in another place. They will help to give a mental concept of the state of relaxation, and will also develop the habit of relaxing whenever movement is not especially required. Many people make a great variety of useless movements without realizing it. Of course, in the case of those who do not take regular exercise, these serve a purpose, for they give a certain muscular activity that would otherwise be lacking; but they are a poor substitute for systematic exercise, and for those taking such exercise are simply a waste of energy. The ability to relax adds so much to one's endurance that it has been found to be an indispensable accomplishment for boxers and wrestlers.

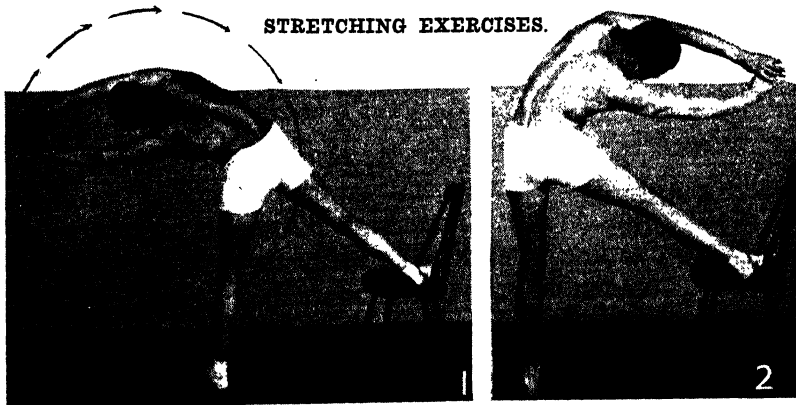
In order to enhance still further the value of such a regimen as the one indicated, breathing exercises should always be included. Proper breathing helps the lungs to keep the blood purified, and thus aids in postponing fatigue. It also assists the circulation. A few deep breaths between movements allow some recuperation and promote relaxation. The proper method of breathing while exercising is partly an individual matter, as the relation of the size and activity of the lungs to the heart and the rest of the body will vary in different persons. Most people find it helpful to breathe a little more slowly than seems natural, but this should not be carried to an extreme. Some will find it easy to breathe through the nose, even during quite strenuous exertion, while others will have to use the mouth.

Breathing Exercises

BREATHING AND EXERCISE.—This subject is fully discussed under *Constitutional Exercises*, but let us note a few points here in relation to breathing. *First*, one should never hold the breath for more than a very brief interval and then only when making some unusual effort. *Second*, the breathing should be

as regular as possible and through the nose as long as possible. *Third*, the rate of the breathing should be adapted, to some extent, to the character of the muscular movements. For instance, when raising the arms overhead it is well to inhale, because this movement raises the ribs; then, as the arms are lowered, the ribs are naturally dropped and the air is forced out. When in the reclining position and practicing the exercise of sitting up and lying down, it is natural to exhale while raising the body and inhale while lowering it, because the former causes a more powerful contraction of the abdominal muscles and a greater compression of the ribs than the latter, so that the air is naturally forced out. While returning to the reclining position there is still some contraction of the muscles, but not as much, and it is easier to breathe in. By noticing the natural movements of the chest and abdominal muscles and ribs, one will be able to determine what method of breathing best suits each movement. The lighter movements do not need to be adapted to the breathing so much as the heavier ones.

Retarding
the Breath



Free hand exercises for general flexibility. Standing in position as shown with foot elevated, rotate the body so that hands describe a circle similar to that shown in illustration.

1. Place one foot on the seat of a chair and clasp the hands overhead. Keeping the arms extended and legs straight, describe a large circle with the hands, as shown in the photograph. Do this both left and right and make the movement as complete as possible so as to give the body a good stretch throughout. Repeat with the position of the feet reversed.
2. Same starting position as used for 1. Bend sideward to the right, touching the hands to the foot, then bend over to the left, touching the hands to the floor if possible. Reverse the position of the feet and repeat. Be sure to keep legs straight. This movement calls into play every muscle of the sides of the body and the legs.



STRETCHING FOR FLEXIBILITY.

1. Sit erect in a chair and hook the feet around the legs of the chair. Bend slowly to the right, stretching downward with the right arm and curving the left over the head as illustrated. Bend above the waist, keeping the hips firm. This stretches the left side of the body. Reverse the movement to stretch the other side. Repeat several times, trying to stretch a little farther at each repetition.
2. Place one foot on the back of a chair or other support which is about the height of the hip. Observing care to keep both knees straight, bend the body forward and touch the forehead to the raised knee. Do the same with other leg raised. This stretches the back and legs. This exercise may be repeated several times.

For a light movement, such as bending the head forward and backward, a number of repetitions may be permitted during each inhalation and exhalation. Finally, in breathing between movements and at the conclusion of the exercise period, the rate should depend upon the severity of the preceding exertion. If "out of breath" do not attempt to force yourself to breathe very slowly, but let the natural demand for air be a guide. However, it is well to breathe just a little deeper and more slowly than seems natural, as normal respiration will be more quickly recovered thereby. If combining the breathing with arm or body movements, the lighter, quicker movements should be used when it is necessary to breathe rapidly, and the heavier, slower ones as the breathing becomes more normal.

REST AND SLEEP.—A discussion of the proper way to exercise really includes the subject of rest, as they go hand in hand. Exercise creates need for rest, and rest creates need

for exercise, because having accumulated a certain amount of energy and muscular power it is necessary to use it constructively. If we do not, it will either expend itself destructively or production will be stopped. In either case deterioration is the result. Alternate exercise and rest maintain the metabolism at a normal rate, so that worn-out cell-matter is eliminated, and fresh material for the repair of old and the building of new cells is provided as fast as required. There is no accumulation of waste products to poison the system, nor any lack of new materials for reconstruction. It is each one's problem to balance his exercise and rest in such a way as to bring about this result.

As most people are busy, or at least think they are, there is a strong tendency to cut down too much on the rest periods. It is true that the amount of rest required can be reduced considerably if one knows how to rest completely; but there is a point beyond which one cannot go. The problem of resting completely is one of relaxation, and the special directions on this subject given in the next section will be very helpful. It is possible, also, to rest one part of the body while using another. Thus changing the character of one's activities will reduce the amount of general rest required, though not the amount of sleep. One should always get enough sleep so that one wakens feeling rested. Some people need only eight hours out of each twenty-four; others need ten, or even more.

**How Much
Sleep Is
Needed?**

It is well, as far as possible, to alternate periods of activity with periods of rest, or at least to change from periods of great activity to periods of lesser activity. For instance, after taking one's exercises in the morning, it is well to rest, if only for a few minutes; usually the comparative rest of the mild exertions required in bathing and dressing will be sufficient. It is only in pathological conditions that complete rest is required for a time after every exercise period. Of course, if one has taken very vigorous exercise, full rest may be required. When an individual is living rightly in other respects he can usually depend upon his feelings to indicate the amount and degree of rest required. If one feels more like resting than anything else after a period of exercise, one should by all means do so; but if, on the other hand, one feels energetic and stimulated, some light activity is quite permissible. This is especially true

if the exercise has been in the form of walking. Most persons will find it best, however, to take their walking and exercise at different times of the day. If the exercises are done in the morning, the walk may be taken in the afternoon or evening, while a morning walk may be taken if the exercises are to be done later in the day. This gives more time for recuperation from the bath, and the two forms of activity balance each other. But whatever your plan of exercise may be, be sure that you obtain the amount of rest and sleep that fits *your* particular needs, so that you are able to start each new day with energy and enthusiasm. Then you will not finish the day completely exhausted.

It is not well to become neurasthenic on the subject of exercise, so that one is constantly wondering whether one is doing too much or too little, whether the movements are being performed in just the right manner, whether they are precisely what is most needed, or sufficient progress is being made, etc. This attitude of mind is a vitality-sapper. It leads to tension and confusion, with resulting distaste, so that the exercise defeats its purpose. Neither should one become careless to the point where exercise is omitted for slight reason, or performed in a half-hearted manner. The thing to do is to lay out a definite regimen which suits one's particular needs and then follow it with reasonable regularity for a sufficient length of time to note results, varying the regimen only as seems definitely indicated by excessive fatigue or lack of results along certain lines. With the aid of the instructions here given anyone who is generally interested in exercise should be able to do this.

PHYSICAL TRAINING FOR WOMEN

Section 2

IT WAS not so long ago that exercises for women were considered unladylike. Muscles were looked upon as vulgar, and a strong woman was classed with the "bearded lady" of the circus side-show. Yet we have become quickly accustomed to seeing women taking part in practically all the athletic activities of men. The entrance of women into athletics has greatly benefited their health, has widened their sphere of activity, and increased their freedom of action. It has liberalized their dress, doing away with corsets, petticoats, long skirts, and piles of hair, natural or artificial. It has done much to overcome prudery, including the idea that there was something indecent about a woman's legs. Not a few girls have made athletics their chosen profession and devote themselves to teaching physical education in schools, and in the Y.W.C.A. or similar institutions, or to playing professional golf, tennis, and even baseball. Athletics have tended to take woman out of the prison-house of convention and superstition she once occupied and have made of her the full partner of man.

**Benefit of
Athletics to
Women**

Though there is no need of campaigning for women's right to exercise, it is still necessary to educate women to the need of exercise. Women need health and strength even more than men; for they are the child-bearers, and upon them, to a large extent, depend the health and vigor of the coming generations. The father's health will, of course, affect that of the child before and after its birth; but it is the mother who is responsible for feeding and caring for the child from the moment of conception until it is able to look after itself, and more especially during the first year of its life. All women should be able to nurse their babies, but, because they have allowed themselves to become weak and flabby as a result of indolence, many are unable to do so. Then there is that other class of women who are compelled to work long hours in the home, or both at

Physical
Limitations
of Women



An erect posture favors the development of chest and shoulders and helps the vital organs in general.

business and in the home, and who break down because they were not properly strengthened in their youth by judicious exercise and attention to general right habits of living. A little knowledge of exercise and a little indulgence in games would do much to take the drudgery out of such work, for usually it is the monotony and one-sidedness which breaks one rather than the actual exertion.

Women are not the weak creatures they have been supposed to be. Their only limitations are their anatomical peculiarities, and the periodicity of the menstrual function. The chest, which contains those organs so necessary to endurance—the heart and lungs—is rather small in comparison to the abdomen, especially in the purely feminine type. Hence these organs cannot become so large and powerful as in the case of the man, who has a large chest

in comparison to his abdomen—if he keeps in condition. Yet even this drawback could, no doubt, be overcome in a few generations by proper training, for any woman can increase her chest-capacity and keep her waist-line down by proper exercise. At the same time it is not advisable that women try to become too much like men. The requirements of motherhood demand that certain characteristics of form and function be retained. By developing her natural characteristics a woman may become very strong and vigorous and still retain the feminine lines of her figure and all her feminine charm. Women naturally

have more vitality than men, and if this were properly directed and conserved through proper exercise and rest, the idea of a "weaker sex" would soon become as extinct as the dodo.

As for the limitations imposed by the periodicity of woman's organic functions, the question of exercise during pregnancy, lactation, the menopause and old age has already been considered in the section *Exercise and Its Effects*. Before the age when menstruation begins, girls can exercise the same as boys, for their anatomical structure is not very different. "Tomboys" are usually the healthiest of girls and make the most vigorous women.

Exercise
During
Menstruation

After menstruation begins, exercise should be adjusted to the particular needs of each girl. In ordinary colleges it is



CARRIAGE OF THE BODY

1. Incorrect sitting posture. Note in this picture how the body is slouched forward, rounding the back, flattening the chest, and compressing the abdomen. The sitter cannot possibly breathe fully in this position, and the abdominal organs cannot be in normal positions.
2. The correct sitting position. Sit well back in the chair, with head and chest up as when standing. Better balance is maintained and tension better avoided by drawing one foot back beneath the chair. In this posture all the organs are given room in which to work.

still a general rule to forbid exercise during menstruation, because the girls are in various states of health and the faculty wishes to be on the safe side. If these girls were examined and classified, it would not be necessary to forbid exercise except to a limited number. Many might have to limit their activities somewhat, but they could still do a part of their regular work. Those girls who are not strictly normal in their menstrual function should seek the causes and make every effort to remove them. Exercise of the proper kind, especially between periods, may be just what is required.

It is well known that special exercises are of great value for correcting malpositions of the uterus, which often give rise to painful menses. These cases should concentrate on such movements and should avoid jumping exercise and very active games until a normal condition has been restored. During the period, when the uterus is heavy with blood, they will have to avoid exercise, but should assume daily, for ten-minute periods, a corrective position. Usually the knee-chest position is best. In cases of profuse menstruation exercise will have to be omitted during the period till normality is restored. Between periods exercise is generally needed to restore the tone of all the pelvic structures. Such conditions are, of course, pathological, and those who suffer from them cannot be classed with normal girls, for whom it is perfectly safe to lay down the general rule that exercise may be continued during menstruation. When there is slight flow exercise can be continued without interruption, unless displacement exists.

There is one form of exercise, however, that cannot be included in this rule. This exercise is swimming. Swimming and diving combine cold bathing with exercise. While exercise is all right, there are many normal girls who would be adversely affected by cold bathing during the menstrual period. However, there is no objection to warm bathing at this time.

Swimming
During
Menstruation

While menstruation may be more pronounced in the case of girls who exercise as usual during their periods, this should not disturb a normal, vigorous girl, especially if her other habits of living are right. A diet containing plenty of raw foods and whole grains and just sufficient in quantity for the body's needs will naturally shorten the period and lessen the

flow. Plenty of sleep and rest are also advisable at this time.

In taking up exercise, however, every woman should consider her type. Some are strongly feminine, some are quite masculine, and some are balanced between the two. The masculine type of woman has broad shoulders, slender hips, and a good chest and arms. She can indulge in almost any of the exercises used by men, even weight-throwing, and she may excel men of equal size and weight at fencing, swimming, and exercises calling for agility. The balanced type of woman can also take part in general athletics though she should lean somewhat more toward feminine specialties such as calisthenics, dancing, swimming, tennis, volley ball, hockey, etc. All types may sometimes indulge in activities for which they are not specially suited, but they should devote most of their attention to those which come natural to them.

They will find them more enjoyable as well as more beneficial.

The three forms of exercise best suited to all women are dancing, swimming, and fencing. Women have the legs, the flexibility, the grace, the sense of rhythm and harmony, and the desire for expression which are required for dancing. Various forms—folk, esthetic, adagio, acrobatic, and others—are good and may constitute a large part of the physical training of women. Women have the subcutaneous fat to withstand cold and to make them buoyant, the smoothness to slip easily through the water, and the sense of rhythm for synchronizing breathing and stroke which are required for good swimming.



Adjustment
of Exercise
for Women

For a Flexible Waist. Interlock the thumbs, then raise the arms high above the head. Now swing the body from side to side at the hips. Later, swing the body in circles, first to the right; then to the left. This stretches the sides and waist line.

Even long distance swimming, which requires a lot of endurance, is within woman's province. Swimming is also valuable to women because it produces bodily symmetry. Fencing is not always available or attractive to women, but it develops those assets which every woman desires—good carriage, poise, grace, self-confidence, and health.

Among games, as among exercises, some are much more suited to women than others. The most justly popular game among women is tennis. It requires skill and dexterity more than strength, and encourages freedom of dress and low-heeled shoes. College girls like hockey and volley ball. Hockey is adapted to women because it requires more leg work than arm work, and speed and adroitness more than strength. Volley ball is good because it is vigorous without being exhausting. Basket ball is best limited to women of the balanced or masculine type who have endurance and combativeness. Another popular game among women is golf. Even the strongly feminine type will have no difficulty in playing this game once she has loosened up her shoulders. It is mild yet interesting and

Games
Best Suited
to Women



For Abdominal Development. Stand erect, heels together; hands by sides. Swing the arms high above the head, palms open and forward, following them with the eyes. Swing the arms down and bend the body so as to touch the toes with the fingers, while holding the knees rigid. This exercise stretches the muscles at the sides and waist line.

gives an opportunity to display both skill and becoming sport costumes. Archery is a mild sport practiced in some women's colleges. It is all right provided it does not foster the idea that women should be excluded from more vigorous exercise.

It is true that women should be excluded from violent games such as football and lacrosse. However, when women play with women, even such strenuous sports as handball, ice hockey, polo, and basket ball are sufficiently moderated to be permissible. In all games, it is

well to keep competition from becoming too keen, since women are emotional and are inclined to waste a lot of valuable nerve energy. The excitement may also lead them to play when they are not in condition to do so.

The choice of games and exercises may be simplified by remembering that the primary purpose of exercise is health, and that this can be built through very simple exercises which practically all women can take, such as calisthenics, walking, and deep breathing. These may be graduated as necessary, and, when given careful attention, will prepare the woman to take up other exercises if she is not in a condition to do so at the start. As for games there is always the mild croquet, roque, and golf, and there will be few in such poor condition that they cannot play a little tennis or do some riding, boating, dancing, and swimming.

As regards combined convenience and effectiveness, however, calisthenics, walking, and deep breathing hold first place. These three forms of exercise will meet all physiological requirements so that, if other forms are not available, there need be no loss of health. No woman who is even approximately normal or who has even a few minutes of available time each day need be denied these forms of muscular activity which are so necessary to glorious and radiant health.

**Three Best
Exercises
for Women**



For the Arms. Lie on the floor, face down, with palms prone under the shoulders. Push the body upward to arm's length until the weight rests on the palms and toes. Knees and hips are kept rigid. Now lower body to first position and repeat several times.



For the arms. A strong stick such as a broom handle may be employed for arm exercise. Useful in movements shown in wand drills, it is most effectively used when braced by the sides of a doorway or otherwise, to permit pulling and pushing movements involving the arms.

CALISTHENICS.—Since women have fewer opportunities to indulge in athletics than men, calisthenics are especially important for them. They can be taken almost anywhere without any special facilities, and can be adapted to the needs of the individual at the start and from time to time as progress is made.

Particular attention can be given to corrective exercises in connection with the general exercise. Calisthenics are not difficult. A few minutes devoted to them each day will be enough to keep any man or woman in condition if other forms of exercise cannot be secured. Calisthenics are particularly important, for those who are not in a position to do much walking or who cannot indulge in sports.

The general method of taking these exercises is the same as that described in the section *Exercise and Its Effects*. Women may give somewhat more attention

to grace and rhythm, however, and should avoid extremely rapid or heavy movements, which give an effect of jerkiness or ungainliness. Music is helpful in maintaining interest and in enabling the one exercising to make the movements smooth and regular. It is best in most cases to use a phonograph or radio when exercising at home, as different musical selections can be employed to give the proper time for the various exercises. Exercising with a leader broadcasting over the radio is not always satisfactory because usually in following a leader who knows nothing of one's individual requirements, the result will not be as good as when one can take one's own time and use the exercises most needed. For those whose needs are really met by such radio classes, however, they are a wonderful

convenience and help very much toward systematic exercise.

The costume to be worn while exercising will depend upon one's environment, the weather, etc. If one is exercising in the privacy of one's own room, and if the weather is not too cold (for remember, the windows must be open), no clothing at all should be worn. When naked, one's freedom of movement is much greater, and the exhilaration and general benefit of the air-bath will be obtained along with the exercise. If circumstances require that some clothing be worn, the next best outfit would be a light one-piece bathing suit. For public gymnasiums, for those women who do not feel comfortable even in private unless they are fairly well covered, a blouse in combination with short knickers or "shorts" as shown in most of the photographs in this volume may be used. A gymnasium shirt may be substituted for the blouse if desired. This costume has been used in other illustrations in these pages. The combination blouse and bloomer costume in one piece is still largely used in women's gymnasiums, but the "shorts" are to be preferred since they give greater freedom and do not bind the leg. They can be combined with the blouse in one piece if desired. For the feet, tennis shoes or regular gymnasium shoes are very satisfactory. If any stocking is worn, it should be little more than a sock.

Women's
Costume for
Calisthenics

The following exercises have been especially selected as meeting the needs of women for strengthening and beautifying

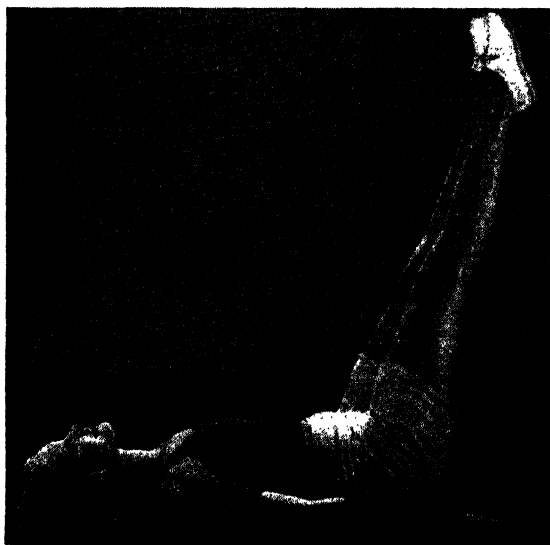


For the Abdomen. Place a cushion or a pad on a stool and sit on the edge of it. Brace the feet under the rung of a table or under anything that will keep the feet in position. Now bend the body back over the stool as illustrated. Return to the sitting position, and repeat several times.

the various parts of their bodies. These will suggest others and any of the movements described in the section on developmental exercise may be employed as well as those in the section on class drills.

ABDOMEN.—The abdomen is one of the most important parts of the body; yet in the case of women, especially, it is generally the least normal part. It is seldom beautiful or strong or healthy. Many women who are not fat and are otherwise well-exercised and shapely are embarrassed by what they call the “spare tire” formation—a roll of flabby flesh in front at the waist line. This yields very quickly to abdominal exercise. The abdomen needs some special attention, even when normal, because of the difficulties naturally associated with our upright posture, our lack of physical activity, and the fact that few forms of muscular work or play use the abdominal muscles as much as those in other parts of the body. For women there exists the additional necessity of keeping the abdomen in good condition in order to enable it to meet the demands of pregnancy and childbirth in a normal manner.

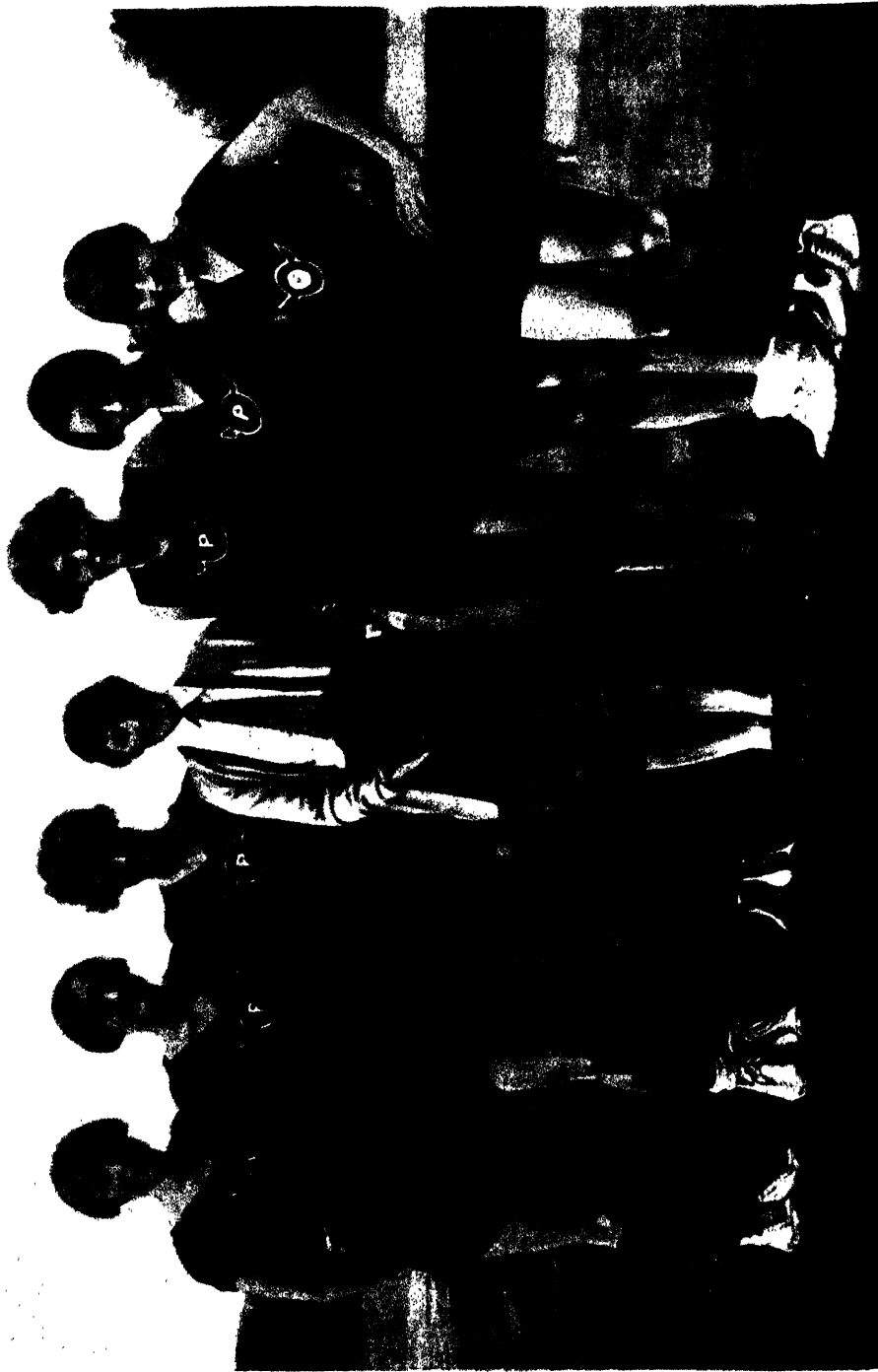
Abdominal
Exercise
for Women



For the Abdomen. Lie flat on the floor, face up, hands by sides, feet and knees rigid. Now raise the legs, bringing them straight up to a right angle with the body. Lower, and repeat several times. A less vigorous method is to raise one leg at a time; or do it scissors fashion—while raising one leg, lower the other, repeating continuously.

So all women should give particular attention to this part of their bodies when planning their exercise regimen.

All bending and twisting movements taken in the standing position are very good for maintaining the flexibility, elasticity, and symmetry of the abdomen, and some of these should always be used. It is equally important to take



PHOTOGRAPH UNDERWOOD & UNDERWOOD

PLATE 35. Champion girls basketball team of an American athletic club for women.

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abdominal exercises in the reclining position. These call for more powerful contractions of the muscles, and hence build strength and bulk of muscle, both of which are necessary if the internal organs are to be given the proper support. The reclining position has the additional advantage of causing the abdominal contents to move upward toward a high normal situation which they retain during the exercise, so that, as the muscles develop, they have a tendency to "form," so to speak, about the organs and hold them in their proper place. If there is an actual prolapsus, the reclining position with head lower than the feet should be employed. If there is one kind of exercise that everybody needs, it is abdominal movements taken in the reclining position.

ARMS.—The woman with properly developed arms, neither weak and lean, nor heavy and fat, can perform her tasks, in housekeeping, or in office work like typing, more efficiently, and has, in her leisure hours, one of the greatest assets of beauty. Most women wish to be particularly lovely when they dress for the evening, and evening dress so prominently displays the arms that ungraceful or under-developed arms will spoil an otherwise beautiful woman. Exercise does not make women's arms knotty with muscle, because women aren't built that way. It merely shapes them to their proper contours of beauty.

Well-developed Arms in Women

The exercises for the arms themselves include movements for the upper arm, the forearm, and the hands. Practically all exercises which involve the arm muscles also employ the hands and forearms, but a few extra movements for these parts will be valuable. Since arm exercises usually require the hands to grip, so some movements calling for extension, adduction, and abduction of the fingers should also be used. Graceful hands depends upon good muscular control. This can only be obtained through practice of the lighter finger movements. Learning to play a piano is helpful here. When the hands are adequately exercised, the forearms will take care of themselves, since many of the muscles controlling the finger actions are located in the forearm. General calisthenics for the arms are always used. If these parts of the body need reducing or building up, more persistence in exercise will be necessary.



For the Back. Place the hands on a stool or a chair as illustrated, stretching the legs well out. Lower and raise the hips, keeping the knees and elbows rigid. Repeat several times. Now put the hands on the floor in the same manner and repeat the movement.

BACK.—Most women have lamentably weak backs—unless they have been brought up on hard work. If they have worked hard, the back is often so stiff that neither circulation nor nerve action is at its best. The woman in the house needs a strong but flexible back to withstand the varied strains of housework—lifting, carrying, bending. The woman in the office needs a strong back in order that she may maintain a normal posture in spite of the great tendency toward round shoulders produced by bending over a desk all day. Though weak backs are due primarily to lack of exercise, many of the back aches suffered by women are not alone a result of weakness but of the spinal curvature produced by wearing high-heeled shoes. Until these are eliminated, exercise for the back cannot be fully effective.

The girl who develops a strong, flexible back will retain symmetry of youth through the years more successfully than the woman who neglects this feature. Those entering upon motherhood also will find that a well-developed back will aid in retaining beauty of form after the experiences of maternity.

The movements for the back illustrated here will be found to improve the posture as well as the muscles. It would be well, as the strength grows, to add others taken from *Developmental Exercise*, page 1125. If there is a spinal curva-

ture, as is all too frequently the case, consult the section on *Corrective Exercise*. Those who have a strong back developed by hard work but who lack flexibility should use stretching exercises, though ordinary bending and twisting movements may also be employed.

BUST.—Most women think of the bust as being synonymous with the breasts. As a matter of fact, the bust includes the head, neck, shoulders, and chest or those parts reproduced in the kind of statue or portrait known as a bust. Here, for the sake of better classification, the bust shall be deemed to include only the chest and the breasts. The breasts, not being of muscular tissue, cannot be directly affected by exercise. But exercise for the chest certainly improves them, by stimulating the circulation through them and by developing the muscles that hold them up and hence make them shapely.

Every woman is interested in having a beautiful bust. She seems to feel instinctively that it is the crowning factor in the ensemble that makes a beautiful woman. There are biological reasons for this. A well-developed bust indicates that the woman is sexually active and fit for motherhood, the primary reason for her existence and the most important achievement of her life. It is also an indication of good general health, for the reproductive glands influence and are influenced by the other glands of internal secretion, and health is closely associated with the activity of these parts. Thus we see the value of exercise in beautifying the bust, since it favorably



For the Breast. Grasp the edge of a table, legs stretched backward, knees rigid. Push the body upward by straightening the arms until the elbows are rigid. Do not bend at the waist. Then lower the body to first position and repeat several times.

The Bust
and the
General
Health

affects all parts of the body, and in the process of building better health improves the action of all the glands, including the mammary glands or breasts. But because there are so many other factors which also affect the glands, especially diet and the emotions, one should not depend upon exercise alone to beautify the breasts.

No less important than general right habits of living is general exercise. It should always be taken in addition to any local movements. The local movements only are described and illustrated here because the others are given in previous sections. It is well to take the whole series which one is going to use once a day, six days a week, and to take the local movements an additional once a day.

**General
Exercise and
the Bust**

The same exercises are used for developing or reducing the bust. As has been explained in another part of this book, exercise is a normalizing process which, in connection with proper diet, develops or reduces as needed. The size of the



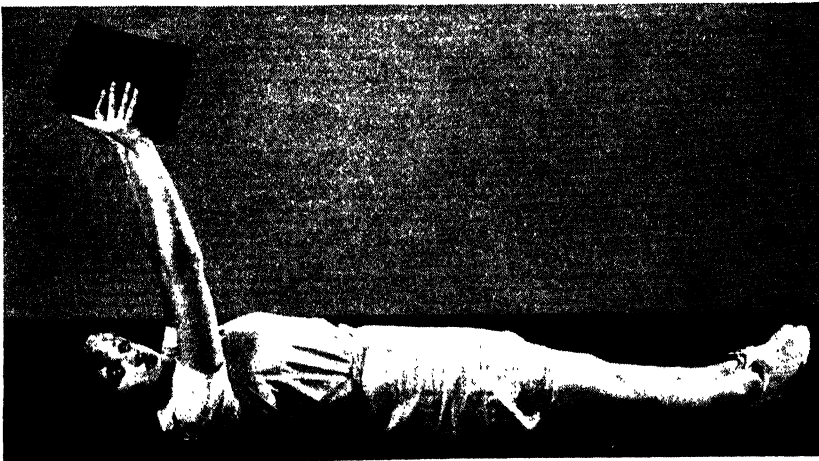
For the Breast. Instead of a table, as in the first exercise, grasp the edge of a chair and lift the body straight up, as here illustrated. These exercises can be varied by holding elbows and knees rigid and moving the body only at the waist and hips, up and down and from side to side; also by placing the hands on the floor and finally by placing the feet on a chair or table, keeping the hands on the floor.

breasts cannot be greatly altered. Form and tone are the important things to consider. If the breasts are well rounded, firm, and properly supported, they will be beautiful, regardless of size. Only when breasts are too fat can they be reduced, and over-fat breasts are never firm or properly supported. Very large breasts are no longer considered as beautiful as medium-sized, well-rounded breasts.

CHEST.—Women need to pay particular attention to developing their chests because most of them have inherited the tendency toward a small thorax. This is due to the fact that very few women in past centuries have been called upon to perform work which called for much deep breathing, and it is only recently that they have taken up athletics. It should be remembered that the size of the chest is governed mainly by the bony framework. The development of this structure depends upon deep breathing during the growing period. A good sized chest gives more room for those vital organs, the heart and lungs, so that they can function more normally. A good heart and lungs mean more vitality, more buoyancy and more energy, so that a woman blessed in this respect will be more vivacious, graceful, and "light on her feet."

The Chest
and General
Vitality in
Women

Since deep breathing is so important in developing and



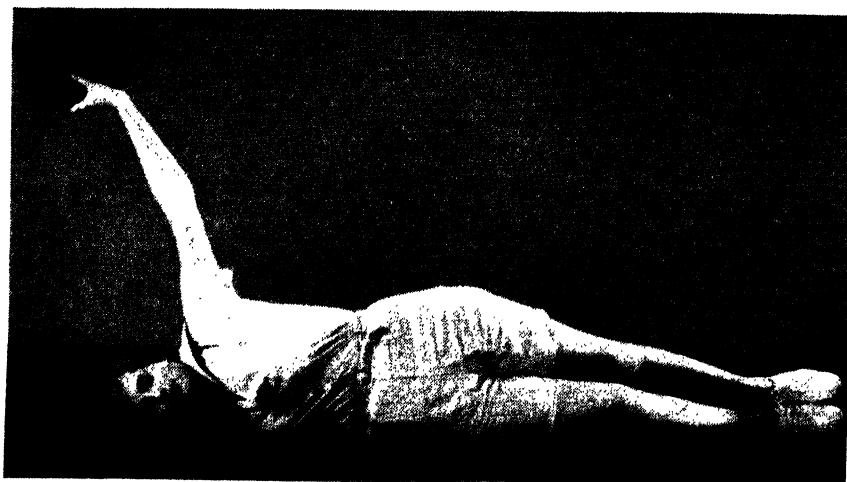
For the Breast. Lie on the floor, and stretch the arms well back over the head. Now move the arms upward and forward, keeping the elbows rigid. Repeat the movement back and forth several times. A piece of wood, or a couple of books may be used for additional effort. This exercise may be done with the arms extended in the form of a cross, instead of back over the head, and then brought together in front of the bust.

beautifying the chest, some attention should be given to breathing exercises in addition to the natural deep breathing which will accompany muscular exercise. Suggestions for all these will be found in other sections. For local exercises affecting the chest muscles, see the section *Bust* preceding. In addition, give careful attention to maintaining proper posture at all times.

FEET.—If a woman wishes to be really healthy, strong and beautiful she must have normal feet. Painful, aching, burning feet are certain to interfere with the health through nerve-irritation and waste of nerve energy. Strength will be reduced for these same reasons and because many forms of exercise will be impossible on account of the pain. No one can be graceful, entertaining or at ease when the feet are complaining.

Importance
of Normal
Feet to
Women

Until the proper shoes are worn women must expect to continue to suffer with their feet, but exercise for the feet to increase their strength and resistance will do something to counteract the bad effects of the shoes. Walking in the proper manner in a reasonably sensible shoe is very helpful. Massage and foot baths are also of value. See *Corrective Exercise* for exercises and other means of strengthening and beautifying the feet.



For the Breast. This exercise is similar in principle to the last movement. It is done with the person lying on the right side, then on the left, using one arm only. Continue until slightly fatigued.

HANDS.—In many cases it is not necessary to give any attention to the hands, except as far as beauty culture is concerned, since their manifold duties give them plenty of exercise. Nevertheless, stretching exercises for the hands are very helpful since they maintain flexibility and make the hands more graceful. Making gestures is also good.

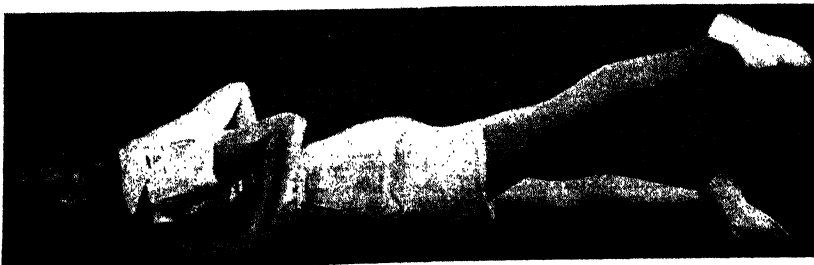
Exercise for
the Hands

For those who feel that they need special exercises for the hands those described in *Developmental Exercises*, page 1123, will do very well. Most arm exercises also use the hands to some extent.

HIPS.—Hips are a bugaboo to any woman inclined toward stoutness. Those who have slender hips usually congratulate themselves but sometimes this slenderness is due to a small pelvis which will make childbirth difficult. Often this smallness of the pelvis is due to lack of proper exercise during the growing period. No woman should be averse to having the broad hips natural to her sex. She should merely see to it that they do not become too fat. The natural tendency on the part of women to put on excess weight about the hips is accentuated by sedentary occupations. With reasonable care in eating and proper exercise, however, any woman should be able to keep her hips normal.

In order to have perfectly normal hips, exercise should be started in childhood. If one has reached maturity and finds that the hips are undeveloped, not much can be done to change the bony structure, but the muscles can be developed to give a better appearance. The exercises used for this purpose will also reduce the hips if they are too large and will increase the control over the muscles so that the movements of the hips will be more graceful. The rolling is of value not only

Normally
Developed
Hips in
Women

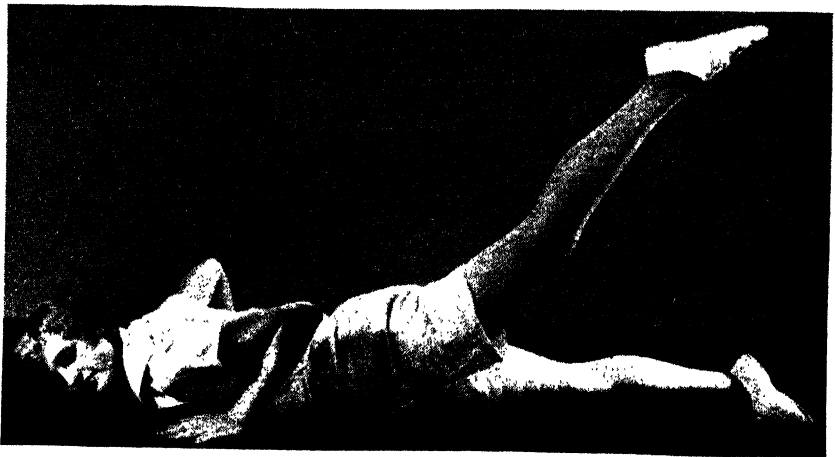


For the Hips. Lie face downward on the floor. Raise and lower one leg at a time, keeping the knee rigid. Repeat several times.

for the hips but for the entire body. It acts in some respects like mechanical massage. It equalizes the circulation, relieves tension and counteracts some of the bad effects of the too long continued upright posture. When sitting or standing the back should be erect, but a little time spent in the recumbent position in addition to the hours spent in sleep will have many good effects. Rolling also helps to keep the buttocks from becoming too prominent, a condition which distresses many women. Rolling exercises are given on page 1069 of this Volume. These exercises may be taken any time during the day, when most convenient. In the morning on arising is one of the best times to perform them.

Leg-exercise
for Women

LEGS.—The legs are closely related to the hips. They, too, need to be strong and beautiful if a woman is to be at her best. The most common defects in women's legs are underdevelopment or excess fat. Even if it may be said of extremely rare cases that overdevelopment exists, this is quite a different matter from excess fat. In certain types the legs are heavily built by nature and in other types they are light. While exercise will somewhat modify these characteristics, such cases can never attain the results possible to a woman who is of the balanced type. This need cause no regret because what is natural to a type looks best on that type, regardless of the individual's personal opinion. When sufficient



For the Hips. From same position shown in the preceding illustration, instead of merely raising and lowering the leg, rotate it from the hip, still keeping the knee rigid. Repeat several times, first with one leg, then with the other.

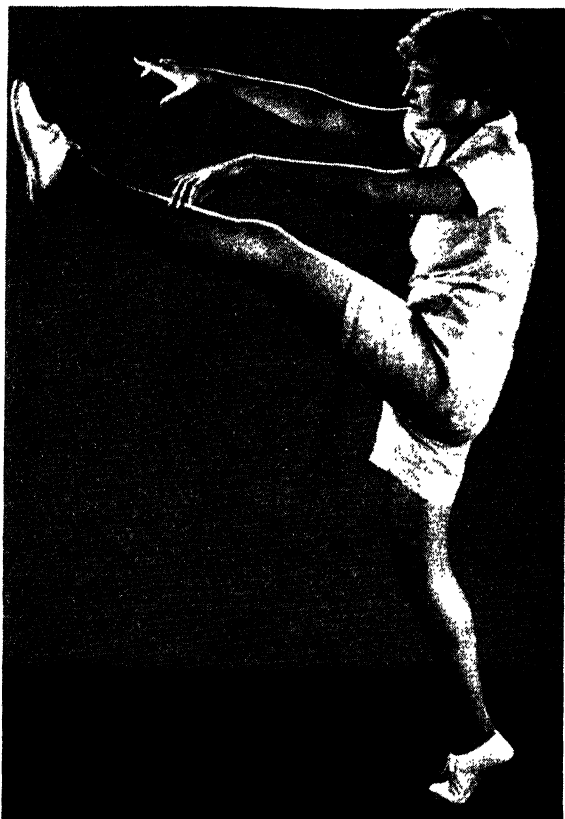
exercise is taken to make the legs strong and enduring, they will generally be found to have become symmetrical and beautiful at the same time.

A few exercises for the legs are illustrated here. Those given for the hips and those described in this volume under *Developmental Exercise* can also be used. Walking, running, swimming and all active games are excellent for improving the legs. It is especially necessary

for those who wish to develop the calves to avoid high heels, since they take away the necessity for making the fullest use of the calf in walking.

NECK.—It is seldom necessary to take very strenuous exercises for the neck. The neck develops readily and a reasonable amount of such exercises as are here described and illustrated will build up the neck to a normal condition—or will reduce it to normal if it is overfat to begin with. The exercises advised for the shoulders and chest can also be employed to advantage, since they use the neck muscles to some extent and, through improving the adjacent parts, lend more strength and beauty to the neck itself.

SHOULDERS.—The bony framework of the shoulders is



For the Hips. From the standing position, kick upward with the leg as high as possible, rising on the toe of the supporting foot. Note the position and lack of tension of the arms.

Exercise for
the Neck
in Women

formed by the *clavicle* (collar bone) and the *scapula* (shoulder blade), but the muscles which cover these parts are usually classified as neck, back, chest and upper arm muscles. Hence the reasons why every woman should have strong beautiful shoulders are the same as the reasons why she should have a strong, beautiful neck, back, chest and arms. All these parts are so intimately related that what applies to one applies to all.

It might be especially emphasized, however, that the contour of the shoulders and the way they are carried has much to do with the general grace and carriage of the body, and that the strength of the arms depends largely upon the strength of the shoulders. Women who desire beautiful shoulders should not, therefore, depend upon the application of creams, but should give attention to proper posture, deep breathing, exercise, etc. Thus they improve their health and efficiency along with their appearance.

The exercises given here for the shoulders affect chiefly the trapezius muscle which determines the line of the shoulders. They also affect the upper chest muscles which help to fill out

the front parts of the shoulders. Other movements for these same parts and for the deltoid muscles which cover the points of the shoulders will be found in the volume under *Developmental Exercise*.

WAIST.—The only point about the waist which interests most women is its girth. As a matter of fact, however, the

Exercises
for Shoulder
Muscles

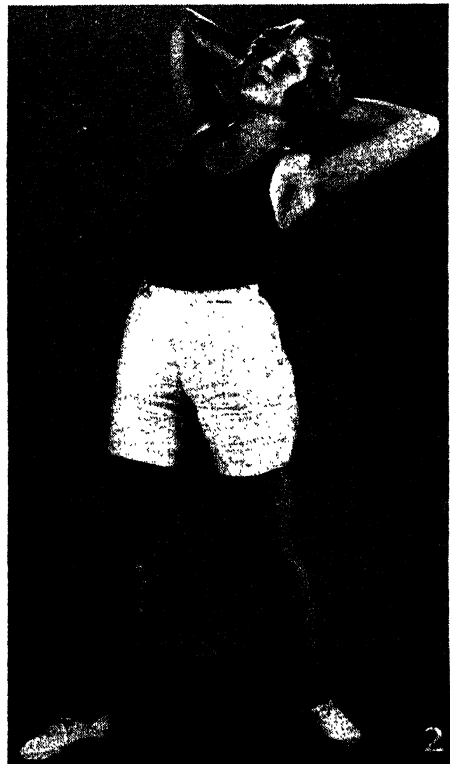


For the Hips. Stand on all fours. Now kick upward and backward with the leg as far as possible. Repeat several times; then do the same with the other leg. This exercise is effective in improving the contour of the legs.

**FOR THE WAIST**

1. From standing position with bent elbows raised side outward, lunge forward on the right foot. Vigorously rotate the body at the waist as far as possible left and right. Return to first position, lunge with the other foot, and repeat the waist movement. Continue several times.

2. Place the hands behind the head while standing with feet apart. Throw the head well back on the palms. Now bend the body to the right, getting a stretch on the waist line and, maintaining that stretch, keep turning the upper part of the body in circles, from right to back, to the left side, down in front and up the right side to first position. Reverse, and repeat several times, always concentrating the movement and the attention on the waist line.



"waist line" is only an imaginary line like the equator. The waist line is really the central circumference of the abdomen and all that has been said of the abdomen applies here. The waist must be strong if it is to be beautiful. The only kind of a corset that is ever any good is a muscular corset. Properly develop the abdomen and the waist will take care of itself.

Exercise for
the Waist in
Women

The exercises illustrated here as being especially applicable to the waist will be found to be of the bending and twisting variety as they affect the side abdominal muscles which are often neglected even when the other abdominal muscles are exercised. These are the muscles chiefly concerned in giving the proper "lines" to the waist. Of course, any abdominal exercises, whether in the standing or reclining positions, may be used to advantage.

WALKING.—Calisthenics for developing all the different parts of the body should be supplemented by walking and deep breathing. Walking is a natural exercise for women since they have comparatively greater strength in their legs than in



1. For the Shoulders. From the position here illustrated strike vigorously upward with the arms, return to first position, and repeat several times.
2. Move the shoulders to describe a circle forward and backward, separately and together, several times. This is a splendid exercise for filling in hollows around collar bones.

other parts of the body. At the same time it does not require great strength in any part but does build endurance, which means health. This is the reason it is so valuable during pregnancy, especially during the later months when other forms of exercise may have to be limited or even prohibited.

Some women have the idea that they should stay off their feet as much as possible during pregnancy, but this is by no means a wise plan. Walking at such a time does not cause varicose veins or other abnormalities but will do much to prevent them. There is much difference between walking and standing still in one place for a considerable period of time, and also between walking and working on the feet where the movements are limited both as to frequency and scope.

**Walking
During
Pregnancy**

It is unfortunate that such a splendid exercise as walking should take so much time. This one factor is the main reason that most people do so little walking. However, most people waste at least an hour a day which could well be devoted to walking. While three or four miles a day, which is about the

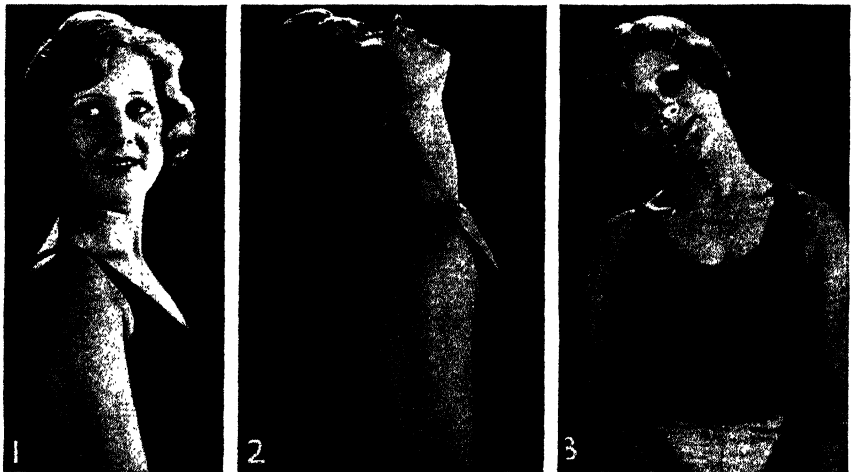


3. For the Shoulders. Stand or sit erect, chest up, abdomen in. Now bring the shoulders far forward, as illustrated; separately, then together, swinging them well back after each forward movement.
4. Stand or sit erect. Raise and lower the shoulders separately, then together, several times.

1062 SUGGESTIONS FOR WALKING

**Combining
Exercise
with
Women's
Other
Duties**

distance that would be covered in an hour, is not as much as could be taken, it will serve quite well for most women. For those busy mothers and housewives who are "going all the time" and never have a moment, it is possible to combine the walking with other duties such as shopping, taking the baby out for an airing, or taking the younger children to school. When shopping, instead of going to the nearest stores (unless these are an ample distance away), select some at a greater distance and walk briskly between the different ones. It may take a little longer but not as much as might be expected, for it is surprising how much time is wasted unknowingly by useless window shopping. When taking the baby out for an airing, instead of sitting in the park or in front of the house for the greater part of the time, walk during the full period you are out. The baby likes to go and if you set a good pace will enjoy the outing all the more. Thus both will benefit. For those ladies who are not tied down at home but are always going to the club or somewhere, it is suggested that they walk to their various appointments instead of riding.



1. For the Neck. While standing or sitting with chest and head erect, turn the head to the right, getting the chin as nearly over the shoulder as possible. Then turn the head completely around to the other side. Repeat, twisting the tissues to the limit.
2. Raise the chin and throw the head back, without jerking, as if trying to get the back of the head on the shoulders. Then swing the head forward until the chin is down on the chest. Repeat several times.
3. Bend the head to the side in an attempt to touch the cheek to the shoulder without raising the shoulder. Then swing the head to touch the other cheek on the other shoulder. Avoid a jerking motion; repeat several times.

All walking should be done in proper shoes. It is impossible to be graceful in high-heeled, narrow-toed shoes. Walking in such monstrosities is more like hopping along. The ankles teeter from side to side, the knees are bent, the abdomen is pushed forward and made unduly prominent and a sway back is produced, not to mention a tendency toward round shoulders. If women would have a few x-ray moving pictures taken of themselves while walking in high-heeled shoes they would soon see how ungraceful they are. If it were only a matter of looks or grace, however, such shoes would not be so objectionable, but their bad effect upon the health leaves no excuse for their use. They produce flat and otherwise deformed feet, spinal curvature, malpositions of the pelvic organs, and they interfere with the circulation. Fortunately shoes for all purposes are now made with a low or at least a compromise heel, so that women no longer wear stilts all the time but they still wear them far too much. Many women do

**Effects of
Improper
Shoes for
Women**



For the Neck. The preceding exercises can be made more vigorous by lying across a couch and allowing the head to swing over the side. Now perform the movements in the preceding exercises, bending and turning only the neck, and not moving the rest of the body. Persons with poor circulation should not attempt these movements in this position.

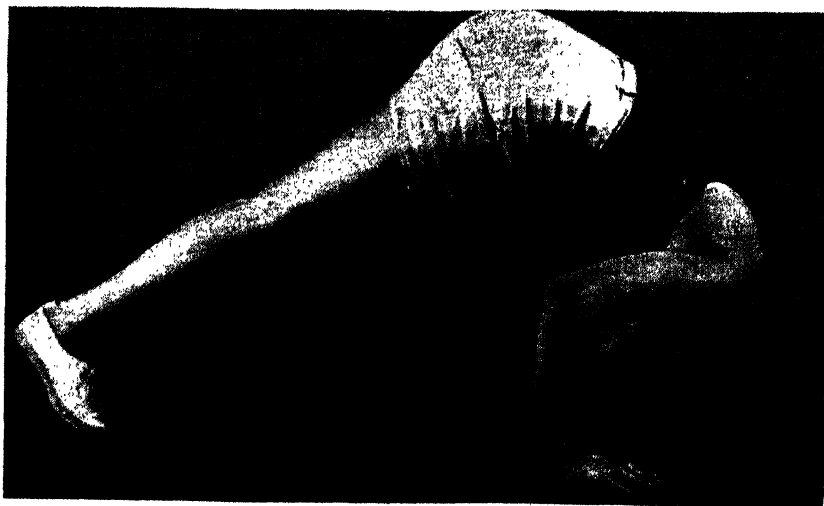
not feel that they can afford special shoes for walking and are inclined to use old, partially worn-out dress shoes which have high heels. The remedy is: never buy a pair of shoes with high heels or pointed toes. If there were no demand, they would not be manufactured.

Costume for
Walking

The rest of the costume for walking is not of such vital importance as the shoes. Almost any kind of an outfit may be worn as long as it is loose and comfortable enough to permit free action of the muscles. Women's dresses, suits, and coats are now so sensible that one's ordinary clothes can be worn even on a long hike if special ones cannot be secured. If one is in a position to do a lot of walking or is going on a walking trip, it is well to secure knickers, a khaki or woolen shirt, depending on the weather, and such outer garments as the temperature may require, usually sweater, wind-breaker, or mackinaw. A soft hat and woolen hose complete the outfit.

For further suggestions on walking see the section on *Constitutional Exercises*.

Those exercises related to walking, such as running, roller and ice skating, skiing, tobogganing and rope-skipping, are also particularly adapted to the needs of women. The running, however, should not be carried to extremes that demand great endurance. It is the custom at present to limit women's



For the Neck. From position illustrated, roll the head backward and forward and from side to side, giving some support with the arms.

participation in running races to short dashes such as the fifty and hundred yards and the one hundred yards (or less) in hurdles. This is no doubt a good practice, but there is no reason why women with powers of endurance should not, when properly trained, take part in longer races. When competing against members of their own sex, they will not be likely to strain themselves. However, races longer than a mile have no particular advantages and are just as well avoided. The best form of running for women is the plan of alternate walking and running which has been discussed in another section. There is no competition associated with this but it is excellent for building endurance, a quality which most women lack. This lack is not due to any inherent weakness but to the fact that they seldom need physical endurance and hence do not develop it.

**Running as
an Exercise
for Women**

Roller- and ice-skating, skiing and tobogganing give more exercise than walking, without any undue demand upon the nerve-energies. They have been fully discussed elsewhere, and all that has been previously said of them applies here.

Rope-skipping, while valuable for health-building, must be employed with certain restrictions by women; but the normal woman need not fear that she will injure her heart or displace her organs by this form of exercise. When the general rules which



For the Legs. In standing position, stretch one arm outward while gripping the opposite foot with the other hand. Now raise and lower the heel of the supporting foot. Reverse and repeat several times. Vary by hopping on the supporting foot.

**Rope-
skipping
for Women**

apply to all exercises are observed, there will be nothing but benefit from it. As already noted, women lead much too sedentary lives, and they need the active shaking up that rope-skipping gives them. However, rope-skipping should not be used, when there is a prolapsus, or during pregnancy and menstruation, and it should be employed in moderation in cases of excess weight. When the organs, either pelvic or abdominal, are already prolapsed, the muscles and ligaments are too much weakened to endure the strain of the jumping. These cases should concentrate on the special exercises applicable to the specific condition. During pregnancy and menstruation the uterus is too heavy for even normal ligaments to maintain it in the strictly correct position if much jumping is done. When there is considerable excess weight, the jumping is too hard on the arches. Since there may also be some degeneration of the heart, it is better to postpone the rope-skipping until some reduction has been brought about through diet and other exercises, after which the rope-skipping will be very valuable for producing further reduction. There is no need to forbid little girls to jump rope for fear they will injure

themselves in some way. They should merely be cautioned not to jump just to see how long they can jump. In all cases where rope-skipping is used some exercises in the reclining position should also be taken.



For the Legs. First movement.—Stand with one foot well in front of the other. Now squat on the rear leg, keeping the back erect. Return to standing position. Repeat several times, reversing the motions.

Second movement.—Assume squatting position, extend one leg to full stretch, return, extend the other, and repeat the exercises several times.

DEEP BREATHING.—In order to secure the greatest benefits from walking it should be combined with deep breathing. Suggestions along this line have already been given in other parts of this book. Attention to deep

breathing is especially important for women, most of whom live sedentary lives or at least do not take part in activities which are likely to develop the function of respiration.

Deep breathing is doubly beneficial when associated with walking, for the oxygen is better utilized, as more carbon dioxide is eliminated.

At the same time the filling of the

lungs tends to keep the chest up and leads to a better posture. When walking, it is always important to keep the chest up and the chin in, as this maintains the spine in the proper erect position. A graceful carriage can easily be developed through walking if some conscious attention is given to the matter. The cardinal principles are the lifted head and chest, the relaxation of all muscles not actually in use, and the long, free stride.

POSING.—Posing, while it may not seem so, is a form of exercise and one which is especially suited to the inclinations and needs of women. It is of value for teaching muscular control, which leads to grace, flexibility, and symmetry. It may seem like inviting trouble to tell a woman to practice posing in front of a mirror, but there is a difference between posing for purposes of physical development and merely admiring one's features in the glass. The women who are so interested in their faces will receive quite a shock when they start practicing full-length posing, for they will discover that they are sadly deficient in development and grace. Such posing should, of course, be done in the nude, or in a one-piece bathing-suit, in order that clothing may not hide any deficien-



Deep
Breathing
for Women

For the Legs. Place hands on hips. Bend knees to the squatting position, at the same time raising arms as illustrated. Again place hands on hips, while resuming standing position. This exercise can be varied by raising the hands above the head while assuming squatting position.

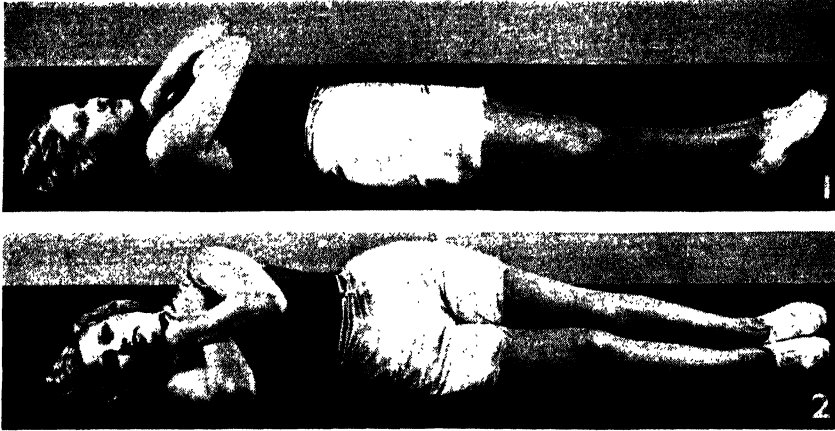


1. For Poise and Good Carriage. Stand erect and stretch the hands upward as high as possible, following the movement with the eyes; then try to make the finger tips reach higher still.
2. Bring the arms back with the hands in front of the shoulders as illustrated, without lowering the chest, then straighten the head and arms. This will leave the back in the correct erect position. It is an excellent exercise for developing the proper carriage of the body.

cies which need correcting nor any good points which will encourage one to strive for even greater perfection.

Posing as an
Exercise for
Women

When men pose they do it mainly to show their muscles, and the positions assumed, therefore, are often stiff and tense. This, when followed by relaxation, gives them considerable exercise but does not promote grace. Women can use some of these tensed poses to improve their muscular control and as a



1. Rolling Exercise. Lie flat on the floor. Cross the arms over the breasts to protect them. Stretch the toes well forward.
2. Now roll over on the right side, then face downward, then over on the left side and back to face-up position. Repeat in the opposite direction. If there is plenty of space, the person may roll completely over like a log, several times in one direction, then back in the other direction.

means of watching their development, but they should give more attention to poses demanding flexibility and grace.

Posing of this sort is not especially strenuous, and many find it helpful to practice the movements before retiring at night. It gives just enough exercise to produce a little fatigue, and at the same time brings about relaxation, so that sound sleep comes quickly. It is not necessary to have a full-length mirror. Posing can be done with a smaller mirror or none at all.

ROLLING EXERCISES.—Among other exercises that have been recommended for weight reduction, rolling exercises may be mentioned. These exercises are performed by lying down at full length and rolling over sideways or backward and forward. Such exercises are particularly well adapted to bedroom use. When convenient, they may be taken immediately upon arising as a series of morning-awakening movements. When taken outdoors, soft, grassy ground is to be preferred. Precautions should be preserved to avoid going over on hard or jagged objects with consequent injury.

Another caution that applies to exercises of this sort when taken by women, is to fold the arms upon the chest so that one may roll over upon the elbows and protect the tissues of the breast from injury.

Rolling for
Weight
Reduction

CONSTITUTIONAL EXERCISE

Section 3

EXERCISES, games and sports most useful as constitutional exercises are those which do not require very powerful muscular contractions and can be continued over a relatively long period of time. This means that there will be no violent exertion and no great expenditure of nerve energy, but only a mild, long-continued stimulation of the circulation and, through this, of all the functions of the body.

Some familiar constitutional exercises are walking, alternate walking and running, breathing, stretching, relaxing, so-called setting-up exercises or free-hand calisthenics, floor calisthenics, wand movements, drills with light Indian clubs and dumb-bells, dancing, the games of childhood, golf, quoits, croquet, bicycling, rowing, horseback riding, snowshoeing, camping, fishing, hunting, canoeing, and gardening. The more active games, such as tennis, basket-ball, handball, baseball and even football, are largely constitutional, and may be made entirely so by eliminating competition and evenly matching persons and teams. Such individual sports as running, swimming, and jumping may be included in this class, if racing and strenuous competition are avoided.

Popular
Sports

But no matter how much other exercise is taken, each period of activity may be properly started with constitutional exercise, in order that the foundation of normal organic functioning may be maintained and there may be no disproportion in the development of organs and muscles. The exclusive use of heavy exercises may develop large muscles without greatly increasing the efficiency of the heart and lungs, or contributing to vital endurance. In fact the large-muscled person is often more susceptible than others to adverse influences in his environment.

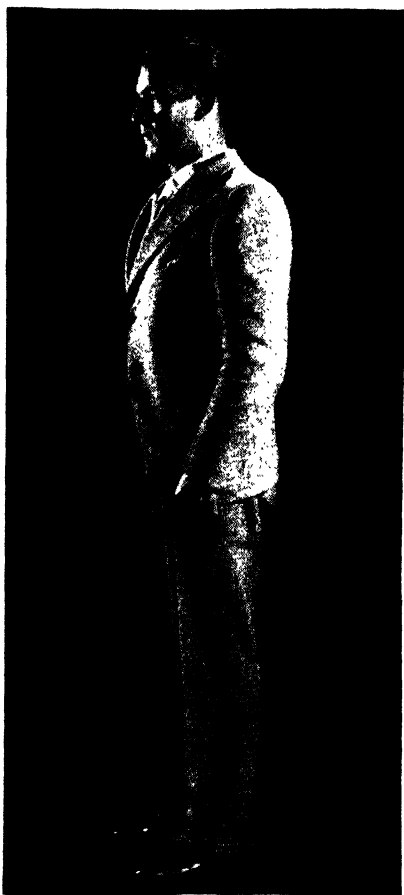
One can limit oneself entirely to constitutional exercise, if so desired, without any diminution in health. All the organs will perform their duties as they should, and a reasonable

amount of strength can be developed. On this plan, however, it is necessary to spend a little more time in exercising than when heavier movements are used, as constitutional exercise requires long-continued repetition of light movements, so that a considerable amount of work is done without strain or excessive fatigue.

This section takes up various forms of constitutional exercise, and it is peculiarly appropriate that breathing should come first, as it is the most important of all forms of constitutional exercise.

BREATHING.—While the term “breathing exercises” is a common one, many persons do not consider breathing an exercise. It is so much a part of daily life that even special breathing seems like merely doing more of the same thing. Yet breathing is very definitely an exercise. It uses the muscles, stimulates the heart action, increases the circulation, improves the elimination, washes out the carbon dioxide from the blood, and has almost all the good effects of more general muscular activity. Those who have read the first volume of this work will already have some idea of the great necessity for and the immense value of breathing. Yet with all we know about breathing it is only just beginning to be understood. With all the special courses on breathing there are few which get to the root of the matter.

Breathing has the most profound influence upon every part of the body, including the brain. It is well known that



Correct standing position: head up, chin in, chest high, the abdomen relaxed but normally back, and not in a straight line with the chest. Standing with the weight on one leg, except for short periods, may produce some degree of curvature of the spine.

**Breathing
Exercise**

fear in its various forms, as well as extreme surprise, will inhibit or momentarily stop breathing, while pleasurable excitement or anger will quicken it. It may not be so well known, however, that similar emotional states may be produced by regulating the rate and depth of breathing. Actors, especially moving-picture actors, take advantage of this fact. The heaving breast of the outraged heroine is a good example. If breathing can thus affect the emotions, it must have an equal or greater effect upon the body, not only through the brain which controls the bodily actions, but directly upon the cells. This it does in two ways, by the increased oxygenation it produces and by the action of the breathing-muscles.

Breathing
and the
Organs

It will be remembered that when we breathe, oxygen is passed into the blood and carbon dioxide is released and breathed out. We also get oxygen from water and food, but these sources are less important than air. The real life-sustaining supply depends on breathing. This oxygen is constantly at work in every part of the body. Strange as it may seem it is both a builder and a destroyer. It is a builder in that it enters into the composition of all tissues; it is a destroyer in that it is the agent of the combustion which is constantly going on in the body. It burns fats, sugars and part of the proteins to produce the heat that keeps the body warm, and the energy to operate it. Toxins of all kinds can only be burned up or oxidized by oxygen; therefore oxygen is of the greatest importance in elimination. Even the carbon dioxide which is eliminated as waste from the body contains two parts of oxygen to one of carbon, as is indicated by the chemical formula CO_2 . In the light of these facts it will readily be seen how important is the function of breathing.

The Dia-
phragm and
Breathing

The rise-and-fall of the ribs and diaphragm which brings about the intake and expulsion of air is, necessarily, accomplished by muscular action, and therefore has the usual effect of perfecting the cells of the muscles concerned. These mechanical movements affect the circulation and elimination, and the movement of the ribs has some stimulating effect upon the spinal nerves, through the pressure and pull upon the ligaments and connective tissues and the increase of circulation around the spine. The action of the diaphragm has much to do with the changes in air-pressure which occur during inhala-

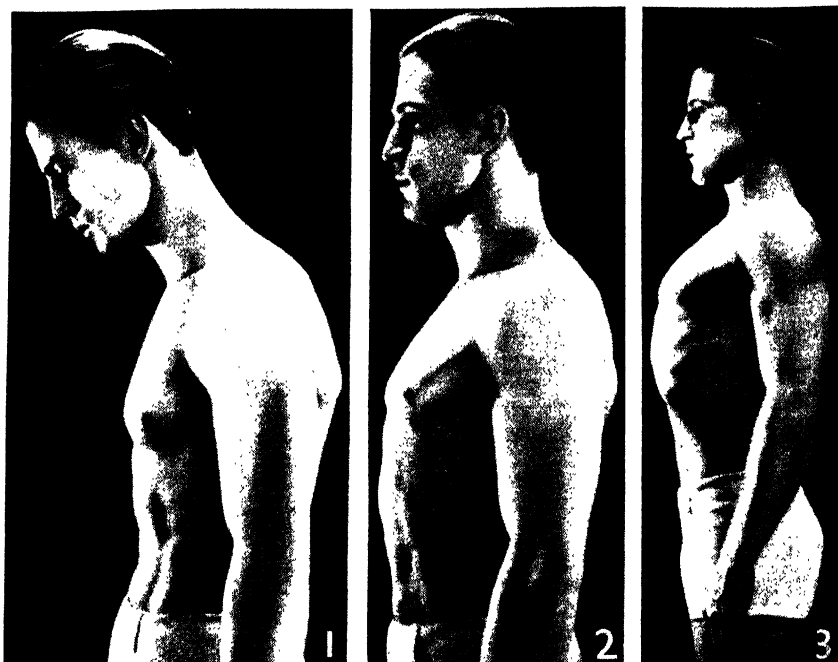
tion and exhalation, and this of course affects both the nerves and the circulation.

This rhythmic variation in air-pressure, together with the ebb and flow of the air in and out of the lungs, has a great but little understood influence upon the bodily vibrations. Some idea of this can be gained from what has been said in regard to the effects of breathing on the emotions; but the full effects are much more widely distributed, for the vibrations of both body and brain can be slowed or accelerated by controlling the rate and depth of breathing. Palpitation of the heart can usually be controlled by deep slow breathing, and the same applies to nervous irritation and the tendency to do things with a rush. When one is all "keyed up"—that is, when the vibrations are rapid and inharmonious—there is nothing like controlled breathing to slow down, refine and harmonize the vibrations, thus restoring calmness, peace and control. On the other hand, if one is lethargic, has too slow a pulse, or is threatened with a fainting spell, deep rapid breathing would be indicated as one means of speeding things up.

Breathing
and
Vibration

No matter what part of the body you consider, you will find that breathing is a most valuable exercise. However, breathing and general muscular activity so often go hand in hand, and are so inextricably bound up with each other, that it is hardly possible to consider either by itself.

This close relation between breathing and exercise is best illustrated in swimming. Many people have learned to keep themselves afloat in water without having given any attention to their breathing, but they are never able to swim any distance or to look after themselves in rough water. Those who really know how to swim have learned how to adapt their breathing to their muscular movements. Such an adaptation is also necessary, to a considerable extent, in taking ordinary exercise. If the breathing is timed and adapted to the movements, so that it is regular, deep and as unimpeded as possible, it will soon be discovered that endurance will be much greater and one will not become breathless so easily. It can readily be seen that attempting to breathe in when the abdominal muscles are strongly contracted cannot result in a full breath, because the pull of the abdominal muscles holds



BREATHING EXERCISES

1. Forced exhalation. Note how the head is lowered, shoulders brought forward and abdomen contracted so as to compress the ribs and force out all the air possible. This is done only when practicing special deep breathing.
2. Normal inhalation. Both abdomen and chest are expanded, indicating that the diaphragm has been lowered and the ribs lifted, thus allowing the lungs to expand equally in all parts. Many make the mistake of holding the abdomen in and not lowering the diaphragm sufficiently.
3. Forced inhalation. When it is desired to expand the lungs to the limit it is necessary to lift the ribs very high. This necessitates some retraction of the abdomen so as to support the filled lungs. When taking a complete breath, the position shown in 2 always precedes that shown in 3.

**Inhaling and
Exhaling**

the ribs down. Inhalation should accompany movements which assist in raising the ribs, such as raising the arms and shoulders, bending backward, etc. Exhalation should accompany those movements which assist in depressing the ribs, such as abdominal contractions. If one does not pay any attention to controlling the breathing during exercise, one will find oneself taking long and short breaths, holding the breath and breathing very irregularly. This always interferes with proper oxygenation of the blood and tissues and hence hastens fatigue. A little observation and practice will soon enable anyone to regulate the breathing in accordance with the movements being taken.

Another relation between breathing and exercise is in the amount of oxygen absorbed and carbon dioxide eliminated. Forced deep breathing, without exercise, will cause more oxygen to be absorbed than ordinary breathing, but it cannot be properly utilized by the blood, as is often indicated by the dizziness which follows such breathing. *Forced deep exhalation*, clears the lungs and the blood of excessive quantities of carbon dioxide. By starting gradually, resting frequently, and using the mind along with the breathing, the dizziness can be prevented and good results secured; but even so the results are not quite so beneficial as when the breathing is combined with exercise. Then more carbon dioxide is eliminated and the oxygen is not only absorbed but actually utilized in various ways by the body. Toxins from both normal and abnormal sources are burned up, old tissues are broken down and cleared out, and new ones are built up. Deep breathing is always beneficial, but when combined with exercise it is doubly so.

**Forced
Breathing
and
Dizziness**

There are very few people who habitually breathe in the right way. A considerable number may realize the importance of breathing and make some effort to regulate it, but the few minutes each day which they devote to such exercises are not sufficient to produce the habit of proper breathing. In order to develop this habit it is necessary not only to practice frequently and persistently, but to live rightly in all respects. Because of catarrh, or for other reasons, the nose may be stopped up so as to make proper breathing impossible. If one eats too much the stomach will be distended, thus preventing the proper descent of the diaphragm during inhalation. If insufficient exercise is taken the breathing is inclined to become very shallow. Improper posture makes it impossible to breathe correctly. Depressing emotions also inhibit normal breathing.

One of the most prevalent and harmful of breathing-habits is that of shallow breathing. Machines do so much of our work for us these days that there is little demand for muscular exertion, and the body learns to put up with the minimum of breathing. Nearly everybody sits a great deal, generally with the shoulders humped forward, and one has to look very closely at such people to discern any move of the chest at all when they are breathing. Those who do much mental work

**Shallow
Breathing**

may actually forget to breathe for short periods when they are concentrating deeply. Breathing is automatic to a large extent, but when the energies are being strongly concentrated in one direction the body may economize for a minute by not sending any to the subconscious centers which are carrying on the breathing. The accumulation of carbon dioxide and lack of oxygen soon forces a breath, however, and this is generally taken with a sigh. Thus does Nature try to make up for the brief interruption of respiration. People who are continually sighing and yawning are shallow breathers. The important thing in all these cases is to practice deep breathing frequently—every hour or even oftener, especially when out of doors—in order that the habit may be developed.

The next most common of such habits is mouth-breathing. This may result from some obstruction in the nose, such as enlarged turbinate bones, polypi or other growths, adenoids, scabs and mucous discharges. In these cases, of course, the obstruction must be removed, in some cases by operation. However, after the mechanical difficulty has been overcome it still remains to break the habit. Many people have started breathing through the mouth when children, because of adenoids, and continued to do so for years afterward, even after the abnormal growths had been removed. Every effort should be made to overcome the habit even prior to the removal of the causes. At night it may be necessary to tie the jaw shut with a special bandage, though this should not be done unless one is able to breathe freely through the nose. One should not sleep on the back. The habit of mouth-breathing may be acquired merely through sleeping on the back, in which position the jaw naturally drops open, as the muscles relax in sleep. During the day it will be necessary to turn the attention frequently to the breathing to see that it is being done through the nose and that the mouth is being held shut. The very mental determination necessary to do this supplements one's efforts, as the emotion of grim determination naturally expresses itself in a set jaw and firmly closed mouth. If one is persistent the habit will soon be overcome.

This is of the greatest importance, because mouth-breathing is detrimental in many ways. The air is not properly cleansed, warmed and moistened before it enters the lungs.

Breathing will be more shallow, because the air enters more easily, and there is not the same demand for a high lift of the ribs and deep descent of the diaphragm as when it is necessary to produce a difference between the inside and outside air-pressures sufficient to force the air through the narrow passages of the nostrils. These passages, since they are not being cleansed by the flow of air, will accumulate dust and dirt, will dry out, and will soon become breeding grounds for germs, waiting to take advantage of any increase of toxins in the body or diminution of vitality, which is almost certain to result from the shallow mouth-breathing. The throat will become dry also, and dust and dirt will be carried into the lungs, because it will not be filtered out of the air by the fine hairs and mucous surfaces in the nose.

A third bad breathing-habit is that of using only a part of the lungs. This is an outgrowth of shallow breathing, especially when it results from such causes as tight clothing, improper posture and lack of exercise. The usual habit is to breathe almost entirely with the upper lungs, though some people, since so-called abdominal breathing has received so much publicity, have switched to breathing, chiefly with the lower lungs, which is just as bad. When only a part of the lungs is being used many air-cells may be practically undistended. This is particularly true of the apices. Naturally, any part which is not in use deteriorates. It is in these stagnant parts of the lungs that tuberculosis may gain a foothold. Normal breathing will keep all parts of the lungs active and constantly bathed in fresh air, so that they will be clean, strong and vigorous.

**Effects of
Improper
Breathing**

What is the right way to breathe? This is an important question. There are various methods, each claiming to be superior to all the others, but the only proper way to breathe is the natural way, by a rhythmic rise and fall of the ribs and diaphragm.

Most people think of breathing as being in and out, but if they will reverse this conception and think of it as out and in, they will be more likely to breathe deeply and completely. Unless the air is thoroughly emptied from the lungs a completely fresh breath cannot be taken. After the most forcible and complete exhalation there is always left in the lungs

approximately three pints of air, but the majority of people allow an additional three pints to remain. Of course, the depth and rhythm of the breathing will depend upon the degree of exertion, and it is even permissible to breathe through the mouth during strenuous activity, but for all ordinary purposes the method should be as follows:

First, exhale the air through the nose, then inhale through the nose, filling the lower parts of the lungs, then the middle, then the upper parts or apices. This sounds very simple and it is just as simple as it sounds.

All the fuss about holding the body just so, contracting this muscle and relaxing that, and so on, is largely unnecessary. If you wish to take an unusually full breath, force out as much air as possible by strongly compressing the ribs and abdominal muscles. This will expel approximately two quarts of air loaded with carbon dioxide. Then, since all but the residual air (3 pints) will have been expelled, there will be a strong impulse to take in a good full breath and to fill the lungs from the bottom upward to the top. Such full breathing is not necessary for each breath, but is valuable when taking breathing exercises. For ordinary breathing sufficient air will be expelled by simply relaxing all the breathing muscles, then, when breathing in, distending all parts of the lungs to some extent, but not to the fullest.

Correct
Breathing
Habits

In other words there should be a slight rise of the chest as well as a distention in the abdominal region. This distention of the abdomen is not a result of air in that part of the body, but is due to the pressure of the descending diaphragm upon the abdominal contents. This forces them into a smaller space vertically, so that there is a distention circumferentially. It is therefore important that the abdomen be kept relaxed. It gives a better appearance and extra support to the digestive organs to keep the abdominal muscles somewhat contracted, but it is not natural and interferes with free breathing and normal action of the stomach and intestines.

If one takes sufficient abdominal exercise and practices drawing in the abdomen frequently (keeping it relaxed between times), the muscles will be strong and large enough to give all needed support to the abdominal contents, even while they are relaxed. Therefore no special effort should be

made to contract the abdominal muscles (except when exhaling very completely preparatory to taking a very deep breath). Whatever contraction is necessary will be produced by the natural coordination of the muscles involved in the act of breathing.

One important point to remember in breathing is proper posture. If the back is not held erect, it is impossible for the ribs to lift and the diaphragm to descend as they should. This is especially true when sitting. If the shoulders are allowed to sag forward, all the weight of the upper body rests on the abdomen and the diaphragm cannot lift this weight. Hence it descends very little and only a very shallow breath is taken. Holding the back erect gives one a sense of lightness and freedom in the chest region that naturally inclines one to breathe deeply. It is also helpful to hold the head erect, especially while walking. The section on proper posture gives details on this subject.

Posture in
Breathing

When in the erect posture, if one is not accustomed to breathing correctly, one may make sure that the lungs are being properly filled by placing the hands on the sides of the lower chest at the start of inhalation and noting the extent to which the ribs lift forward, sideward and backward. If they do not lift as they should, especially in the back, the movement should be practiced until the expansion is satisfactory. As inhalation continues shift the hands to the upper chest to make sure that the ribs are rising in this locality also.

With proper action during deep breathing, the ordinary breathing will take care of itself.

While it may be necessary to give considerable conscious attention to breathing for a time, one should not allow it to become an obsession. Have one or more regular periods during the day when you practice deep breathing, then do a little whenever you happen to think of it, and you will soon get the habit of breathing correctly, so that you need give little conscious attention to it.

As a rule the best time to take special breathing exercises is in the morning, just before or after rising, and in the evening before or after retiring. In the morning the stomach is empty and there is plenty of room for full expansion of the lungs. The breathing also helps to wake one up, is a good preparation

for the morning exercise or bath, and starts all the bodily functions off right on their round of daily duties. This is especially true if the breathing is combined with autosuggestion. In the evening, while the intestines may be fairly full, the stomach should be about empty, so that the diaphragm will be allowed free action. But most important of all, the deep breathing at this time helps to make up for any lack of air during the day, helps to burn up impurities that may have accumulated, and harmonizes the vibrations of body and mind, so that one is prepared for sound restful sleep. Of course, there is no objection to taking breathing exercises at any time of the day except just after a full meal, but the morning and evening should always be used even though other periods are also employed.

It does not matter so much what particular form of deep breathing exercises you use. If you do no more than inhale and exhale deeply you will be producing most of the physiological effects needed. However, special forms of breathing add interest, intensify certain effects, and improve the control of the breathing muscles. Simple deep breathing is likely to become monotonous, for few people are patient enough to concentrate on one thing for more than a few seconds at a time; but if they can vary the breathing or do something along with it, it helps to keep them at it. Special rates and rhythms of breathing, and special movements performed with the breathing, have particular effects upon the circulation, the tone of the nerves and other tissues, and the position of the ribs.

There are many courses in deep breathing which one may take, some of which go to considerable lengths in giving detailed directions as to rate, depth, pauses, and so on. It is possible that these peculiar "breaths" may not have all the remarkable virtues claimed for them. Yet the fact remains that any breathing course will be helpful, since it stimulates interest in and brings about the practice of deep breathing.

The breathing exercises here given are comparatively simple, but will probably meet the needs of most; any approximately normal person can use them, whether child or adult. They are designed to create the habit of deep breathing, to increase the capacity and efficiency of the lungs, to develop strength and control of the breathing muscles, and to produce

the maximum physiological benefits associated with the practice of correct breathing. So-called "breath-control" is no more than control of the breathing muscles, particularly the diaphragm, and it will be developed to some extent by any deep-breathing exercises. Special exercises for this purpose are of value chiefly to the public speaker and singer, as there is no special health value in being able to control the rate at which the air is exhaled. From the physiological point of view, once the air has been inhaled and held a few seconds it has served its purpose, and the only thing remaining to be done is to get rid of it so that another breath of fresh air can be taken.

Breathing exercises may be practiced in the standing, sitting and lying positions. Some prefer one and some another. Usually it is well to take some in each position, as all have their advantages. The standing position gives the greatest amount of freedom for the addition of muscular movements, but the sitting and especially the lying positions allow greater relaxation, so that more of the attention can be concentrated on the breathing and less energy will be expended. These positions are especially indicated for those not in very good health. When using the sitting position it is very necessary to sit erect. A stool is generally better than a chair. One disadvantage of the reclining position is that it interferes somewhat with the backward expansion of the ribs. However, the interference is slight and is largely counterbalanced by the increased freedom of action permitted the diaphragm. Many breathing exercises can be taken in any one of the three positions, but some are limited to one position. The exercises have been classified according to position, but no hard and fast rule applies. The position may be varied in many instances as suits the needs or convenience of the individual.

Objects in
Breathing
Exercises

BREATHING EXERCISES IN STANDING POSITION.—Starting position: back erect, head up, arms at sides, abdomen relaxed.

1. Exhale completely, pause for a second, then inhale smoothly, steadily and at a moderate rate of speed until the lungs are comfortably full. Do not strain or try to "pack" the air into the lungs. Hold the breath a second and exhale. This is the basic deep breath—the complete breath as some

call it—and teaches control of the breathing muscles and the proper filling of the lungs. Be sure to start filling the lungs at the bottom and work up toward the top.

2. (a) Same deep breath, raising arms forward, upward, overhead, and rising on the toes as you inhale, lowering the arms and coming down on the heels as you exhale. (b) Same as (a) except that the arms are raised from the side directly upward and overhead. These arm movements help to raise the ribs and increase the size of the chest.

3. Extend arms forward, shoulders high, as you exhale; then draw the hands back to the shoulders as you inhale, bending the elbows but keeping them on a level with the shoulders. Force the elbows well back. This movement helps to expand the upper front chest.

4. Clasp hands behind the back, then raise the hands as high up the back as possible as you exhale, and extend well downward, straightening the arms, as you inhale. This assists in training one to maintain proper posture during breathing exercises.

Positions in
Breathing
Exercises

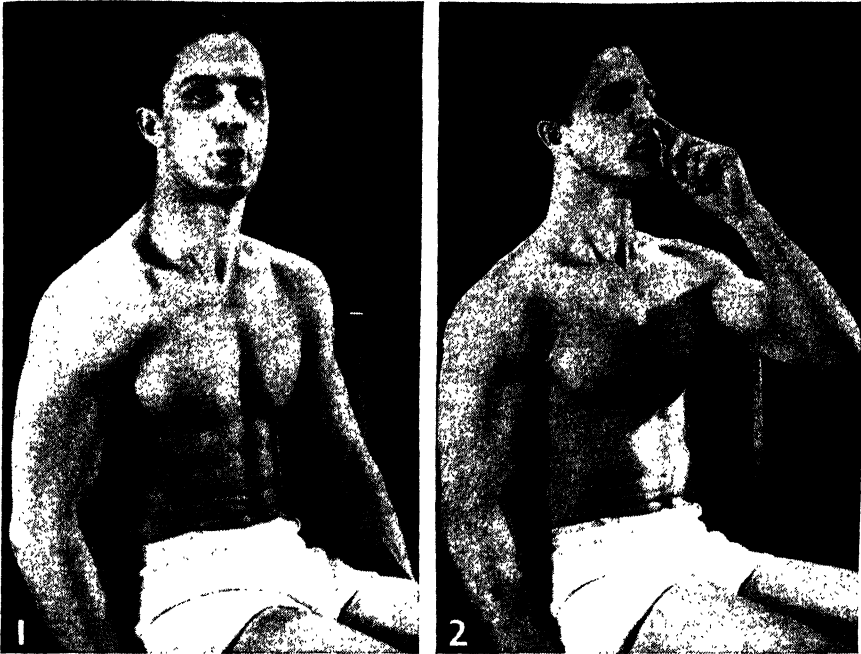
5. Clasp hands behind the head and allow the head and elbows to drop forward as you exhale; then draw the head backward against moderate resistance from the hands as you inhale. This lifts the ribs, produces proper posture, and stimulates the spinal nerves which have to do with breathing.

6. After exhaling, bend the body to the right and raise the left arm overhead as you inhale; lower the arm and return to erect position as you exhale; then bend to the left, raising the right arm as you inhale, and return to position as you exhale. This helps particularly to raise the lower ribs.

7. Draw the shoulders forward and rotate the arms inward as you exhale; draw the shoulders backward and rotate the arms outward as you inhale. This produces the maximum contraction and expansion of the chest on exhalation and inhalation.

8. Extend arms overhead, then bend forward and touch the toes as you exhale, and return to starting position as you inhale. This produces quite complete emptying of the lungs and increases the flexibility of the rib articulations, especially in the back.

9. (a) After the first inhalation, hold the breath for four



BREATHING EXERCISES

1. Exhaling through pursed lips. After taking a full breath, purse the lips so as to make a small opening, then force the air out through this aperture. This exercise develops the muscles controlling exhalation.
2. Inhaling through one nostril. Close one nostril with the finger but be sure to keep the head up. Now inhale through the other nostril. This will necessitate the production of more suction and will develop the muscles having to do with inhalation. Alternate the nostrils both in inhaling and exhaling.

seconds as you bend the body left and right, twice to each side, then relax and exhale. This movement of the body while holding the breath insures the air's reaching all parts of the lungs and the absorption of the maximum amount of oxygen. The inhalation should not be too full for this exercise, just comfortably so. (b) Same as (a), bending the body forward and backward.

10. Clasp hands behind the head, then extend the arms upward with a snap, still keeping the hands clasped, as you inhale rapidly; lower arms to starting position as you exhale, and repeat three times. Inhalation and exhalation are to be performed rapidly, and after the three repetitions there should be a short pause before repeating the exercise as a whole. This is very stimulating to all the vital functions.

**Deep
Breathing
Exercises**

BREATHING EXERCISES IN SITTING POSITION.—Starting

position: back erect, head up, hands on hips, abdomen relaxed.

1. Close the right nostril by pressing on it with the finger of one hand. Then inhale and exhale through the left nostril. Same, closing the left nostril. Same, breathing in through the right nostril and out through the left, and *vice versa*. All this helps to clear the nostrils and to develop the breathing muscles.

2. Purse lips as though about to whistle, then inhale and exhale through this small opening. Owing to the efforts required to get the air through this restricted aperture, the breathing muscles become more strongly developed.

3. Breathe in the ordinary manner, but inhale and exhale as slowly as possible without causing discomfort. This teaches breath control.

4. Inhale a full breath in the ordinary manner, then exhale through the pursed lips in a series of short puffs, with a brief pause between each puff. The puffs should be quite forcible. After all the air is exhaled, inhale and repeat. This cleanses the lungs by ejecting as much as possible of the old air.

5. After blowing out all air, breathe in slowly a good full breath, then open the mouth wide and exhale in one great puff, pushing the air out with considerable force. This develops the muscles concerned in exhalation.

6. After inhaling, exhale slowly by humming "m." The vowel "e" may also be used. One may remain on the same note or run a scale. This teaches breath control and also produces a vibration through the head sinuses which helps to keep them clear. While humming, keep the attention centered on the sound.

7. Bend the body forward as you exhale and return to upright sitting position as you inhale. The forward bend is carried as far as possible. The pressure of the thighs against the abdomen which occurs during this movement mechanically produces a more complete exhalation, resulting in a more perfect interchange of air.

8. After exhaling, inhale a fairly full breath, then exhale just a little and inhale some more; repeat several times until the final exhalation empties the lungs as completely as possible. This exercise is real breathing gymnastics, as it develops all the breathing-muscles, stretches the lung tissues and en-

Exhalation:
Its Part in
Breathing

larges the capacity of the chest, causing the maximum absorption of oxygen and elimination of carbon dioxide. Care should be taken not to strain.

9. Inhale a moderately full breath, then pucker the lips, and while keeping the mouth closed attempt to blow out. This should not be done very strenuously at first, and the air should be released through the mouth after two or three seconds. This has much the same effect as the preceding exercise, but puts the air under greater pressure.

10. Exhale, then voluntarily spread the nostrils and suck the air in as rapidly as possible; exhale slowly and repeat. This is another exercise for the breathing muscles.

BREATHING EXERCISES IN RECLINING POSITION.—Starting position: lying on the back, legs stretched well out, arms at sides, chin up, body relaxed.

1. Place one hand on the abdomen just above the navel. Exhale as completely as possible so that the hand sinks well down, then inhale as completely as possible, pushing the hand up as far as it can be done without strain. This develops control of the diaphragm and expands the lower lungs.

2. Partially raise head and shoulders and stretch forward with the arms as you exhale, return to reclining position as you inhale, raising the arms high overhead. Repeat several times, then relax. This produces very complete exhalation and inhalation.

3. Extend arms sideward, in line with the shoulder, then cross them over the chest as you exhale, and extend out to the side as you inhale. This compresses and expands the upper chest, increasing its flexibility.

4. Breathe in slowly, expanding the chest as much as possible, but instead of allowing the abdomen to expand, draw it in as far as possible, giving the feeling of lifting everything up into the chest. This exercise has a special effect in expanding the ribs. It is also good for prolapsus.

5. While lying relaxed, inhale slowly to full capacity, realizing that you are drawing in one of the finer mediums of life; then as you exhale realize that you are breathing out impurities in the form of carbon dioxide. Coupling breathing with mental realization of what the breathing is doing for the body greatly intensifies the effects.

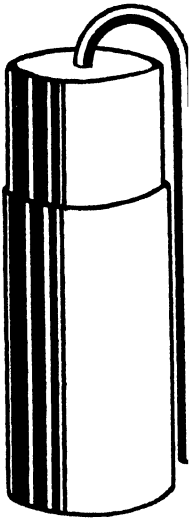
Guide to
Proper
Breathing



BREATHING EXERCISE

3. In this movement, start with the hands either at the sides or overhead. Take a deep breath and hold it while quickly raising the body to the half-sitting position. Exhale while returning to reclining position. Also breathe in deeply while raising the body, and exhale while reclining. Also exhale fully while raising the body and inhale fully while reaching.

These exercises will serve as examples from which many variations may be devised by the individual to suit his needs or desires. It is well to vary breathing exercises as well as muscular ones. All those above described need not be taken at one time. Select those that seem to meet your needs best and repeat each one three or more times, resting a moment after each exercise. The number of repetitions and the variety of the exercises may be increased gradually; but care must be taken not to do so much as to bring on marked dizziness and not to strain either while inhaling or exhaling. The idea is to take sufficient breathing exercise to stimulate all the functions of the body and quickly "wash out" the stagnant accumulated carbon dioxide that is backing up in the blood-stream and tissues, rather than to produce the quickest and greatest increase in the chest expansion or lung capacity. Be content with moderate progress in the latter respects. Do not try to develop any more lung capacity than you are going to require, as the unused areas will inevitably deteriorate and serve as convenient receptacles for dirt and dust from the air and toxins from the body. Let moderation be your watchword, but be sure to do enough to get the habit of proper breathing.



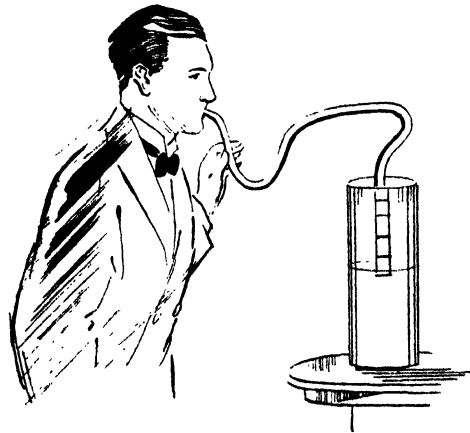
Home-made spirometer. Two tin cans of about one and a half gallons capacity for making a spirometer.

A lung-tester, technically known as a spirometer, is very convenient for keeping account of one's progress, and can also be used as a special breathing-exerciser. Merely seeing how much one can "blow" and trying to increase the amount will be an excellent breathing exercise. Spirometers of various kinds can be purchased from the larger sporting-goods stores, or from surgical-instrument houses. If one is handy with tools a satisfactory instrument can be made at home. One example is as follows:

Provide yourself with two tin cans that will hold a gallon and a half to two gallons each. One should be slightly less in diameter than the other so that it will fit snugly into the larger one. Each can should be open at one end and closed at the other, and the smaller should have a spout at the closed end.

Use of the Lung-Tester

These cans can sometimes be purchased in hardware stores, or they can be made, if one has shears and a soldering outfit. To complete your device, purchase two or three feet of small rubber tubing that will fit tightly over the spout. Now fill the larger nearly full of water. Place the can with the spout inside of the larger can, open end down, spout and tubing up. Your spirometer will then be ready for use. If you wish to add a measuring device you can place a strip of adhesive tape from top to bottom of the inside can. On this the scale may be marked in ink. The scale may be determined by figuring from the height and circumference of the can the number of cubic inches it contains, and



A spirometer made of two tin cans. See text for description of how the spirometer is constructed.

then dividing this number evenly along the tape, having the largest figures at the bottom. When air is blown into the rubber tubing and thence into the smaller can it will cause the latter to rise, since the water cannot be compressed. The more air blown in the higher the can rises and the larger the number of cubic inches registered on the scale.

In determining one's capacity, several trials are allowed, as one can usually blow more after the first few attempts. The effort to blow the maximum should not be made more than once a day, however, and care must be taken not to become so interested and enthusiastic that the matter is overdone and strain produced.

CALISTHENICS.—The term *Calisthenics* comes from two Greek words meaning beauty and strength. In other words, calisthenic exercises build beauty and strength. They are the most common form of constitutional exercise. When people say they take their "exercises," or their "daily dozen," regularly, they are referring to calisthenics. This class of exercise includes all free-hand movements, whether taken in the standing, sitting or reclining positions. They may be taken alone or in classes. (See section on *Gymnasium and Class Work*; also the illustrated individual exercises.)

Calisthenics

Calisthenics have all the good points of constitutional exercise which have already been covered. Their particular value lies in the fact that they may be used by old and young alike, give great physiological benefit for the energy expended, and require no apparatus and no great amount of space for their performance. They are easily learned; yet there is sufficient variety to maintain interest. They develop gracefulness, co-ordination and a sense of rhythm.

From this data the place of calisthenics in the general exercise regimen can be readily determined. For many people calisthenics may in themselves be sufficient, but it is well, as a rule, to add games, and, if great strength is desired, heavier exercise. As a basis for general exercise no reader should have any difficulty in collecting a series of calisthenic movements from the illustrations here given, so as to have a little system of his own. After this has been used awhile another can be formulated, and when several have been learned they can be alternated. Calisthenics do not include all constitu-



PHOTOGRAPH WIDE WORLD

PLATE 36. North American Indian at 58 years, completing a 180-mile run in less than 37 hours. With this example of strenuous exercise in advanced years is shown (in inset) James H. Hocking, a noted American pedestrian, at 70 years of age.

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tional exercises, but all that has been said about the latter applies equally well to calisthenics.

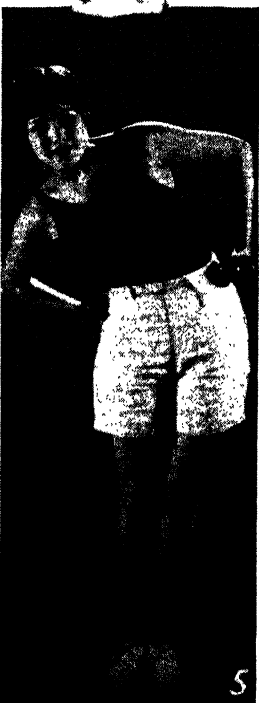
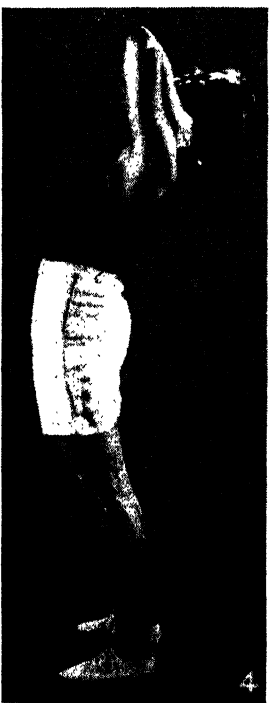
CAMPING.—Camping is not generally considered a form of exercise, but anyone who has ever gone camping knows that it is associated with considerable muscular activity.

If you would secure the most benefit from your camping trip, do not take along too many conveniences. You may miss them a little at first, but you will soon learn to rough it. Conveniences mean less work, less fresh air and more complicated menus, and these are not conducive to constitutional benefit. The equipment you actually require will depend on the nature of the country in which you are camping and on whether you are traveling or staying in one place. In most cases, however, a small tent, blankets, a poncho, a canteen, a few cooking utensils, a knife and possibly a gun, will be enough. Food should be secured along the way as far as possible, in order that it may be fresh. Don't try living on bacon, flapjacks and baked beans, or you will get little benefit from your trip. Nuts, sweet fruits and flaked whole grains can be carried, and fresh fruit, milk and vegetables secured along the way. Very little cooking should be required, as all the foods here mentioned can be eaten raw if desired. Pure water is important and when traveling it is well to take some pains to obtain it. If the supply is doubtful, it would be better to boil the water, cool it, and then aerate it by pouring from one vessel to another.

Is Camping
Exercise?

Summer is the most popular time for camping and for the majority of people the most pleasant. They do not need to bother with many clothes at that season, can sleep more comfortably outdoors, obtain food more easily, and engage in more varied activities in addition to the usual camp duties of foraging for wood, building fires, cooking, washing and so on. Swimming is probably the most valuable of the diversions that summer weather permits. However, there is plenty of benefit to be secured from camping in the spring and fall and even in the winter.

DUMB-BELLS.—Dumb-bells are of various kinds and various weights, some of them very heavy. The lighter kinds especially will be discussed here, for they are the only ones employed in constitutional exercise. As soon as the weight is



DUMB-BELL DRILL. (For description see next page.)

DUMB-BELL EXERCISES

Position at attention: Body erect; eyes front; chest high; abdomen relaxed; chin in; dumb-bells in hands by sides.

1. Bend the elbows, bringing the bells in front of the chest. Rotate body to left, swinging right arm, and throwing shoulder forward, and left shoulder back—*one!* Rotate body to right, swinging the left arm forward and the right back—*two!* The elbows are kept flexed all the time. Repeat from 8 to 20 times.
2. Raise the bells high above the head as illustrated. Swing them down as near the ground as possible without bending the knees—*one!* Return to first position—*two!* Repeat from 8 to 20 times.
3. Raise arms forward, shoulder high. Keeping the elbows rigid, swing them backward and outward behind the back, as in the illustration—*one!* Return to first position—*two!* Repeat 8 to 20 times.
4. Raise arms, side upward, flexing the elbows and bringing the dumb-bells to the back of the neck—*one!* Bend body backward—*two!* Return to erect position—*three!* Lower arms—*four!* Do the same, bending body forward. Repeat 8 to 20 times.
5. Place dumb-bells on hips as shown. Bend the body to the right—*one!* Swing the body over to the left—*two!* Repeat continuously 8 to 20 times.
6. From position of attention, cross the arms forward, as in picture—*one!* Return to position—*two!* Repeat 8 to 20 times, and at each repetition reverse the position of the hands when they cross. This exercise can be made more vigorous by starting with the arms extended sideward, shoulder high, instead of at the sides.
7. This exercise is similar to that of 1, except that the hands are now on a level with the hips instead of with the chest, and the twisting of the body is more vigorous or extended. It is a waist more than a shoulder exercise. (See next page.)
8. Raise arms side upward overhead—*one!* Bend body to the left—*two!* Return to erect position—*three!* Lower arms—*four!* Repeat same, bending body to the right. Repeat 8 to 20 times. (See next page.)
9. The bells are stretched out as illustrated and the body rotated far to the left—*one!* Rotate body far to the right—*two!* Repeat 8 to 20 times. (See next page.)



DUMB-BELL EXERCISES (Continued)

10. Swing the bells from the side to position in picture—*one!* Return to position—*two!* Repeat 8 to 20 times.
11. Raise the bells above the head, standing with feet apart. Now swing the bells down between the legs and as far back as possible, without bending the knees—*one!* Swing the bells back above the head—*two!* Repeat 8 to 20 times.
12. Stand erect with arms hanging at full length, dumb-bells at sides. Then drop to squatting position as illustrated, while bringing arms high to full length overhead as shown—*one!* Resume standing position, bringing arms down to sides—*two!* Repeat from 8 to 10 times.

increased very much the exercise becomes developmental in character. One-pound, or at the most, two-pound bells, are the limit for constitutional exercise. They may be made of either wood or iron, as desired, and can be obtained in any sporting-goods store.

**The Uses of
Dumb-Bells**

The chief advantage in the use of these dumb-bells is that they make certain movements more strenuous, so that greater strength is developed. They are especially helpful in developing the forearm, as such exercises as merely flexing and extending the wrists and similar movements, without any resistance, may be too light to have little strength-building value, though they do accelerate the circulation. However, the dumb-bells, being held in the hands, offer resistance only to arm and shoulder movements, with two or three body-bending and leg exercises. All the movements in a calisthenic drill will not, therefore, be rendered more strenuous by the use of dumb-bells, but the lightest movements will be and that is the end in view. Most body and leg movements are sufficiently strenuous for constitutional purposes without added resistance.

Light dumb-bells do not add much to the interest of exercise, but some people feel that they are not really exercising unless they employ some kind of apparatus and for these dumb-bells are very satisfactory. Wooden wands may be used in the same way and for the same purposes as dumb-bells.

The important point in the use of dumb-bells for constitutional exercise is to adapt the weight to the individual needs. It is better to have them too light than too heavy. Those which are too heavy for the individual's strength not only have the disadvantage of inducing strain, but will prevent the movements from being done in the free, graceful and more or less relaxed manner which should characterize constitutional and especially calisthenic exercises. Of course, some movements can be done with heavier bells than others. It is generally well to have at least three pairs of bells, half-pound, one-pound and two-pound. The light bells are not expensive and almost anyone can afford them. They take up very little space and require no special care.

GARDENING.—The farmer-boy thinks that when he is working in the garden with the hoe or rake he is doing

only labor, but if he will realize its health value he may come to look upon it as does the city-dweller as a pleasant and remunerative form of muscular activity. Gardening, like camping, provides constitutional exercise, for it gets one out into the fresh air and sunshine and causes one to assume many unusual positions and use many muscles which are ordinarily neglected. Moreover, the mere contact with the ground and the handling of growing things is an inspiration to the attainment and maintenance of health by Nature's methods. When one sees the effects of proper fertilizers (food), and of the air, sunlight and water, in causing the green things to grow perfectly from little seeds to mature plants, producing after their kinds, one cannot help realizing that in Nature and Nature's laws lie health and healing.

Gardening

The health value of gardening is therefore both mental and physical, and if properly employed it will be productive of much good. Of course, if a person of limited strength attempts to look after a very large garden he will find it work, and the results will not be satisfactory; also if there are only a few different kinds of plants in the garden, so that much the same movements are employed in caring for all of them, the effects will not be as good as they otherwise would be. The necessity for doing much forward stooping, as when weeding, with little or no backward bending, is probably the only disadvantage of gardening. This can easily be overcome by getting up and stretching when one has been in one position for a time.

For best results from gardening do a little at a time and as much as possible early in the morning or late in the afternoon, avoiding the hottest part of the day; wear no more clothing than is necessary, going barefoot if you can make up your mind to it, but covering the head if the sun is very hot; and take a real interest in the welfare of your plants. It is seldom that gardening fails to awaken this interest, and it is one of its chief advantages that it takes one's mind off oneself and one's troubles. Many persons have been restored to good health merely by the rational use of gardening, together with the eating of the simple natural foods grown in the garden. As it is health-restoring so is it health-preserving, and those are fortunate who can indulge in such exercise.

INDIAN CLUBS.—Indian clubs, as will be seen from the illustrations, are bottle-shaped clubs with a small knob on the upper end. They are made of both wood and metal and in all weights, but for constitutional exercise the same limitations apply as in the use of dumb-bells; that is, the weight should not exceed two pounds. These clubs are made of wood. Professional club-swingers, who use quite heavy ones at times, may have them nickel-plated and otherwise embellished, but this is unnecessary for the ordinary individual.

Indian Clubs

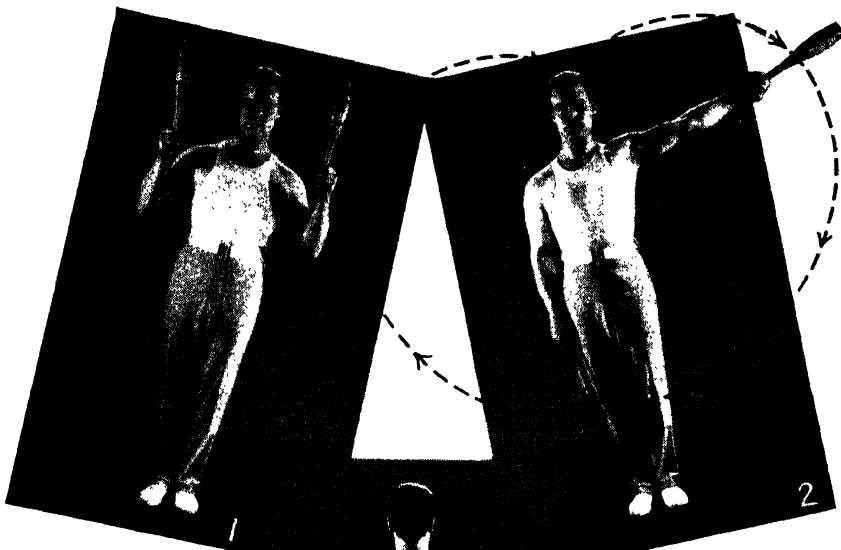
The Indian club is grasped by encircling the neck of the club by the thumb and base of first finger, so that the club can be swung and twirled freely in all directions. Various combinations of full-arm and wrist movements are possible, the clubs being swung in the same or opposite directions, or one club in a full-arm swing and the other in one or several wrist circles. It will thus be seen that the use of Indian clubs affects chiefly the forearm, arm and shoulder muscles, though it is possible to include many of the trunk muscles, especially when heavier clubs are used. This does not cut down on the constitutional benefit as much as might be expected, however, as vigorous use of the clubs with full-arm swings will greatly accelerate the circulation, call for deeper breathing, and even work up a "good sweat."

The advantages and disadvantages of Indian clubs largely balance each other. One example has just been



INDIAN CLUB EXERCISES

The clubs are held with the arms extended outward and moved in circles by wrist movements. 1, Inside the arms several times. 2, Outside the arms several times. 3, Inside and outside alternately, or one with one hand and the other with the other hand. These movements may be tried, 1, with the arms extended before the body; 2, with the arms extended outward from the body; 3, with the arms extended outward and upward from the body.

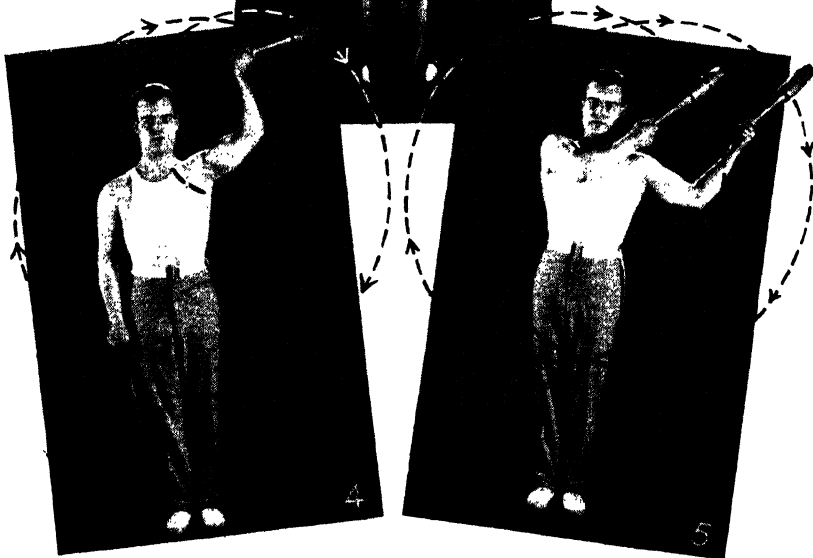


INDIAN CLUBS

Especially useful in exercises for rounding out and developing the shoulders and arms.



They also help to improve the chest and back muscles and develop grace and coordination of movement as well as good carriage.



INDIAN CLUBS. (For description see next page.)

INDIAN CLUB EXERCISES

Position at attention: Body erect; eyes front; chin in; chest high; clubs held as in the illustration, 1.

1. The starting position for most of the Indian Club exercises, though the elbows usually are held closer to the body.
2. From position at attention, drop the right arm to the side; raise the left above the head about the center of the forehead and then swing the club outward and completely around, keeping the arm fully extended except when lowering it a little as it comes to the head position in order to begin again. This movement is the full arm swing, and is repeated 5 to 10 times. Terminate final swing in position 1. The left arm is then dropped to the side and the right is brought into similar action.
3. From starting position, drop the left arm to the side and place the right behind the back as shown in this illustration. By a movement of the wrist, make complete circles with the club to the right several times; then to the left. Next, drop the right arm to the side, bring the left to the waist line at the back, and describe similar circles.
4. Full arm swing with small circle variation. At the completion of the swing, when the arm is directly over the head, the wrist is circumducted, bringing the club in a circular motion behind the head and shoulder. As the club swings up again, extend the arm to perform the full swing. Repeat 5 to 10 times. Termination in position 1. Reverse the movement. Then drop the left arm to the side, and go through similar motions with the right arm.
5. Beginning of the double full arm swing. The arms should be fully extended and kept perfectly parallel as they go around, both in the same direction. The motions are made first to the left 5 to 10 times; then to the right. End each swing, or the series of swings in one direction, in position 1.



INDIAN CLUB EXERCISES (*Continued*)

6. Instead of full arm swings with both arms in the same direction, the arms may circle in opposite directions: Upward, outward and downward; also upward, inward and downward. At first, these swings should be practiced with each arm separately; then alternately; then simultaneously, crossing the arms in front of the body. The movements may be varied by performing wrist swings back of the head and shoulders as in 4; also with the wrist swing back of the waist, as in 3.
7. With arm flexed at the side, describe small wrist circles with the club parallel with the side instead of across the body. Do the same with the other hand in the opposite direction, alternating the two or working both together. Vary the small circle movement with the full arm swing, making the large swing a continuation of the wrist movement. Or describe a full arm swing with one club and a wrist swing with the other, alternating at each swing.

given. Another is that while the effective use of the clubs requires training and practice this factor serves to maintain interest. Most people find Indian clubs very fascinating. After the movements have been learned interest is still maintained in perfecting the swing and grace of the movements. This form of exercise is very good for improving the posture. On the whole, Indian clubs will be found more beneficial than any other form of apparatus offering light resistance, if some additional movements are taken for the body and legs. It is necessary, however, to make sure you have plenty of space in which to swing the clubs, so that you will not break anything.

MEDICINE-BALL.—The medicine-ball is a large leather-covered and usually leather-stuffed ball, semi-hard and made in various weights and sizes. It derives its name from its health-building properties; it is "good medicine." One of the ancient kings is said to have been restored to health by exercising with such a ball after all his physicians had failed to help him.

A ball of about six or eight pounds in weight is generally sufficient for the purpose of constitutional exercise. It can be used alone, but it is more interesting and a greater variety of movements is possible if one has a partner. In the absence of a partner, however, one can throw the ball against a wall, as it will bounce sufficiently to return to the thrower, and a considerable variety of movements is also possible. Only a few examples of the use of the medicine-ball are given, but variations can easily be worked out.

When exercising alone, pick the ball up from the floor and toss it into the air, using both hands but making the toss mainly with the muscles of the back and legs. Hold the ball in the hands in front of the body with arms relaxed, then toss it upward, using mostly the arms. Holding the ball in one hand or in the crook of the arm, toss it across the front of the body to the other hand or arm. With legs spread and ball between the legs, grasp it with both hands and swing it up to the right shoulder, then down between the legs and up to the left shoulder, then back to position. Holding the ball in the palm of the right hand at the level of the shoulder,

**Medicine-ball
Exercises**

**Medicine-ball
Exercising
With Partner**

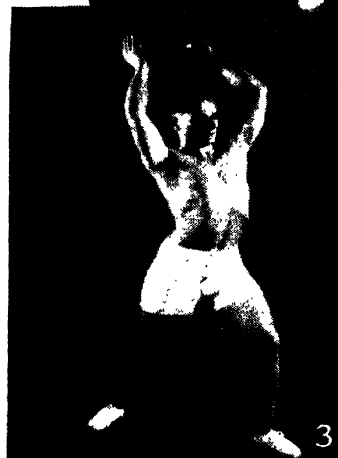
bend to the right, then shoot the ball up into the air by straightening the arm and bringing the body back to erect position. Catch the ball as it comes down and repeat with the left arm.

When exercising with someone else or throwing the ball against a wall, the following movements can be used: Holding the ball on the palm of the hand at shoulder level, shoot it forward as in putting the shot. Grasp the ball in both hands in front of the chest, then shoot it forward by straightening the arms. With legs spread apart, grasp the ball in both hands, holding it out to the right side, then toss it forward by a swing of both arms and body. Do the same starting from the left side. With legs spread and back to partner or the wall, toss the ball between the legs. From same position with ball on the floor between the legs, toss it over the right shoulder, then over the left shoulder. Then toss it directly over the head.



For Relaxation. Stand in a relaxed attitude, without any feeling of strain or tension. Raise the arm, allowing the wrist to droop as illustrated. The arm is then allowed to fall limply by the side, repeating three or four times on each side, shifting the weight from one foot to the other.

A few minutes with the medicine-ball is an excellent way to finish off a period of exercise, whether taken individually or in class. Some care is necessary to avoid strain in throwing the ball from unusual positions, especially when just starting. If exercising with a partner, do not try to see how near you can come to knocking him down with the ball, but give due consideration to his condition of strength and health. As long as the ball does not exceed six or eight pounds in weight there will be little danger of any complications, even in the hands of novices. After little practice a cer-



**MEDICINE-
BALL
EXERCISES**
Showing various
movements to
strengthen all
the muscles of
the body and
produce marked
constitutional
benefit.



MEDICINE-BALL EXERCISES

1. A forward underhand throw, arm swinging parallel with the body, much the same as when bowling. Valuable for the back, side, chest and shoulder muscles.
2. A side throw. The ball is held in the crook of the arm and is thrown with an outward sweep of the arm and twist of the body, bringing the side and back muscles into play.
3. An overhead throw. Grasp the ball in both hands and place it back of the neck. Then fling it forward by sweeping the arms up and forward. This exercises the chest, shoulder and arm muscles, but should be used cautiously, if at all, in case of abdominal weakness.
4. A scoop or ground throw. Hold the ball as shown in the illustration. Now throw it forward, upward or backward between the legs by a combined arm and body movement. This exercises the back, abdominal and shoulder muscles.
5. The chest throw. Hold the ball as illustrated and throw it forward by straightening the arms with a snap. Develops the triceps and pectoral muscles.
6. An overhand throw similar to that used in putting the shot. Hurl the ball forward from position shown by straightening the arm and bending the body forward and rotating it. This exercises the arm, shoulder, chest and abdominal muscles.

tain dexterity will be acquired that will enable one to handle the ball more easily, but this is not necessary in order to get the health benefit of the exercise.

RELAXING EXERCISES.—This term seems somewhat of a misnomer, since relaxation is directly the opposite of exercise. Yet it is a fact that certain exercises will almost automatically produce this relief of tension. Relaxation means complete cessation of all conscious effort, whether of body or mind. We are so accustomed to being “on the go” all the time that when we have a few minutes leisure the habit of doing something continues, and we find ourselves twirling our thumbs, playing with a pencil, twisting a handkerchief, kicking with our feet or rocking violently, anything but just being still.

It takes practice to acquire the ability to relax once it has been lost. Practically all children know instinctively how to do it, but as their consciousness grows and stimuli from the environment increase they become overstimulated and develop chronic tension.

**Relaxing
Exercises**

Relaxation saves energy. Every thought and action requires the expenditure of energy, and while a certain amount of expenditure is necessary in order to keep all parts in good condition and to maintain a constant demand for the production of more energy, any unnecessary use of energy is a waste that is difficult to recoup. If relaxation is practiced whenever there is no special demand for action, even if it is only for a minute or so, one will soon acquire a greater reserve of energy for emergency use and to back up that required for the ordinary activities. Relaxation permits free circulation. Relaxation also allows free nerve-action. As soon as a muscle is contracted considerable pressure is brought to bear on the blood-vessels and the flow of blood is impeded. Relaxation prevents much nerve-irritation from emotional disturbances. When one is tensed all over there is a strong tendency toward irritability, fault-finding, worry, depression and a hair-trigger temper. This is due not only to the physiological effects of tension, but also to the mental confusion always associated with a tensed mind. Peace and calmness are naturally associated with relaxation and it is impossible to have one without the other. This does not mean total lack of activity; it means

Relaxation
and Insomnia

a calm, controlled, unhurried activity. Relaxation helps bring about normal activity of the glands, both of internal and external secretion. All the glands are affected by the emotional states. Unless there is calmness and relaxation they cannot function normally. Abnormal glandular action, in its turn, prevents relaxation, and a vicious circle is started. How important it is that this be broken the science of the glands is demonstrating more and more clearly all the time. Relaxation induces and permits sound sleep. Many cases of insomnia are due to nothing more than failure to relax, especially the mind. When the mind is active there is certain to be some degree of muscular tension, and consciousness will persist. When the mind is at rest it is natural to slip from consciousness into unconsciousness, and though it is possible to go to sleep without complete relaxation, the same amount of real rest will not be obtained. Four hours' sleep with complete relaxation is about as good as eight hours' sleep under tension.

It will be seen from this discussion that the effects of relaxation are strictly constitutional, in that they permit better action of all the bodily functions. Hence, any movements which tend to bring about relaxation may be classed as constitutional exercises.

In learning to relax it is necessary to start with the mind, move to the body, and then return to the mind.

One must have the right mental concept of relaxation before it can be brought about, and this can be obtained by thinking of the meaning of relaxation. To relax means to let go, to give up all conscious effort, to cease striving, to be quiet, to be calm, to be peaceful and patient. Think of yielding, of being plastic and pliable and limp as a wet rag. *When you have the idea you can start to relax the body.* As a rule it is well to begin with the neck. Voluntarily withdraw your energies from this part of the body. Visualize yourself as drawing away and leaving the part "flat." Just let it go. When there does not seem to be any tension left in the neck, move to the shoulders. When these have been relaxed consider the arms, one at a time, then the chest and abdominal muscles, then the back muscles, then the legs and feet. After you have thus mentally gone over the entire body come back

to the neck; you will probably find it has again become tensed to some extent. Relax it and again go over the entire body. It may take several "trips" before complete relaxation is brought about. Give special attention to neck and face muscles, the thighs, hands and feet.

When you are sure you have all the muscles completely relaxed it is time to go back to the mind. You cannot relax completely as long as you are thinking about relaxation. When you have finished with the body, therefore, let go mentally. Cease to give the attention to anything or to any thought which may enter the mind. Just drift, and yet do not give attention to drifting. It often helps to concentrate for a few minutes on the word nothing. This brings the attention down to one point and at the same time prepares it to go on—to nothing. In other words, the mind should finally become practically a blank. This is very close to sleep and many times sleep will result. If so, the ideal has been attained.

Relaxation
Requires
Practice

There will be those who, in spite of faithfully following these instructions, will still be unable to relax. They need more practice; or they may need to remove physical sources of nerve-irritation by correcting their habits of living; or they may be trying so hard to relax that they are unable to do so, for trying means making an effort. Noises should not interfere (though they may at first), as in relaxing one should withdraw from the senses of sight and hearing. In such cases the following exercises will be found very helpful:

In standing position, practice letting the head drop forward, backward and to each



For Relaxation. The arms drop limply, and the head and body follow suit until the position illustrated is reached. The body is then raised slightly and dropped back to relaxed position several times before the erect position is resumed. The knees are not held rigidly straight, but "give" slightly.

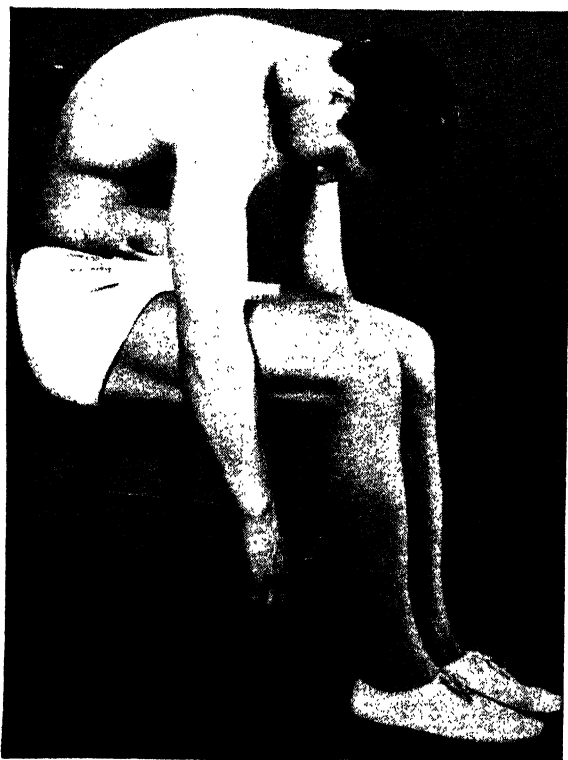
Relaxing
While
Standing

side; let the shoulders droop forward; raise one arm to the height of the shoulder and let it drop and swing; shift the weight from one foot to the other, relaxing the leg not being used; rotate the body left and right, allowing the arms to swing as they will, completely limp. Of course, if one relaxes completely in the standing position one will fall. This position is not, therefore, conducive to complete relaxation, but it is good to use for preliminary practice.

Assume the sitting position. Starting with the neck, relax all the muscles down to the feet in the manner already described for learning to relax. It is best to let the head drop forward, but it may be allowed to drop backward if that seems more natural. The arms should hang loosely at the sides, the knees should be spread and the feet flat on the floor. After

this preliminary relaxation the movement described for the standing position may be employed.

Assume the reclining position. This is best of all for relaxing, as there is no necessity for any exertion; one can let the bed, table or couch, support the entire weight. Think of just sinking into the bed. In order to assist in relaxing the neck, roll the head from side to side. Be sure the shoulders are not being held up; let



Relaxing
While
Reclining

For Relaxation. This illustration shows a person completely relaxed in sitting position. The arms drop limply at the sides; the body drops forward at the waist line; and the head also falls forward as it will. Care is to be observed to keep the legs relaxed. Think of letting all your weight rest right on the chair.

them drop. Raise the arms, one at a time, and let them drop; raise the hand, bending from the wrist only, and let it drop. Raise the legs, one at a time, and let them drop. Be sure that the ankles are relaxed, so that the forward parts of the feet drop outward. Lift the body slightly and let it drop back. In raising the arms, head, body, or other parts, the muscular contraction should always be released suddenly, so that the part drops like a dead weight.

Deep breathing is very helpful in bringing about relaxation. Slow, deep breaths reduce the rate of the bodily vibrations and also help to withdraw the attention from external things. It is well to practice this slow breathing while thinking of relaxation previous to relaxing the body. Then, after the relaxation of each part, take a deep breath and release it suddenly, letting go completely. Each time relaxation will be more complete. As one becomes more relaxed, however, taking the deep breaths is discontinued, as they require effort. The breathing will become very quiet and still, along with the rest of the body, as perfect relaxation is secured.

**Deep Breath-
ing and
Relaxation**

Another form of exercise which helps in bringing about relaxation is stretching, but since this has a value of its own it will be considered in a separate section. When employed it should precede the movements here described.

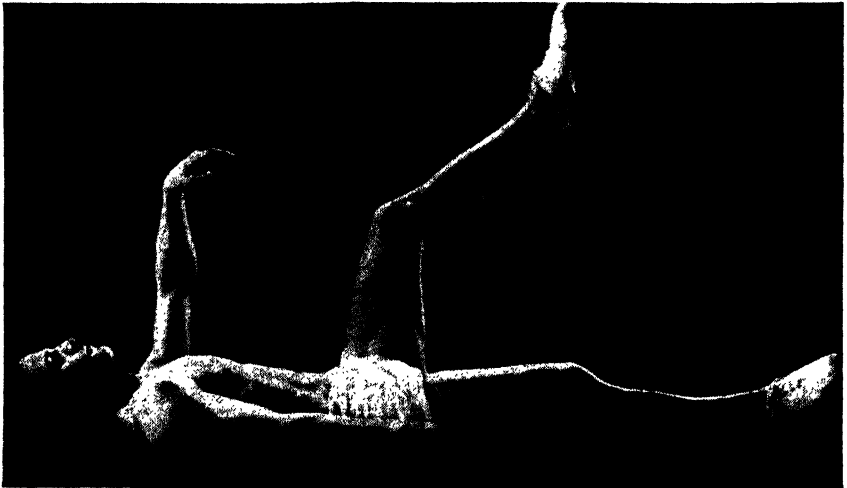
The ability to relax body and mind at will and under any circumstances will be found to be a most valuable accomplishment, and will increase with practice. When under the pressure of important duties, a few minutes relaxation every now and then will give a surprising amount of rest, so that endurance is greatly increased. When necessary to do with but little sleep, perfect relaxation will make the most of the time available. When necessary to concentrate the mind on an important problem, relaxation of the body will permit all the energies to be centered on the mental work. When doing physical work, relaxation of the parts not actually being employed will save energy and improve the efficiency of the parts being used.

Relaxation can be either partial or complete, each having its advantages and each its own place. Partial relaxation should be practiced as frequently as possible, and general

relaxation at least twice a day, morning and evening. The most important time of all for general relaxation is after retiring, in order to prepare for sleep. At this time, or at any other time for that matter, relaxation can be combined to advantage with autosuggestion. Even though one is much limited for time, at least one period of complete relaxation should be included in the regular routine of constitutional exercise.

**Exercises
for Stretch-
ing**

STRETCHING.—To stretch means to extend, to expand, to reach out, to put under tension, and stretching exercises are those which produce these effects. Movements which extend the joints, expand the chest, call for reaching out with the arms and legs, or which put certain muscles and ligaments under tension by contracting other muscles, are called stretching exercises. These are really a branch of tensing exercise, but since they are done with no particular resistance, they do not produce development but are constitutional in their effects. By using the weight of the body and resistance in the form of a wall or doorway, certain stretching movements can be taken without much muscular exertion; but strictly natural stretching exercises are done without any external assistance, using only the muscles of the body.



For Relaxation. The easiest way to relax thoroughly is in the reclining position. The hand and leg may be raised, limp at the joints, as illustrated, and then dropped like dead weights to the padded floor or mattress, repeating two or three times on each side in order to bring about a more thoroughly relaxed condition.

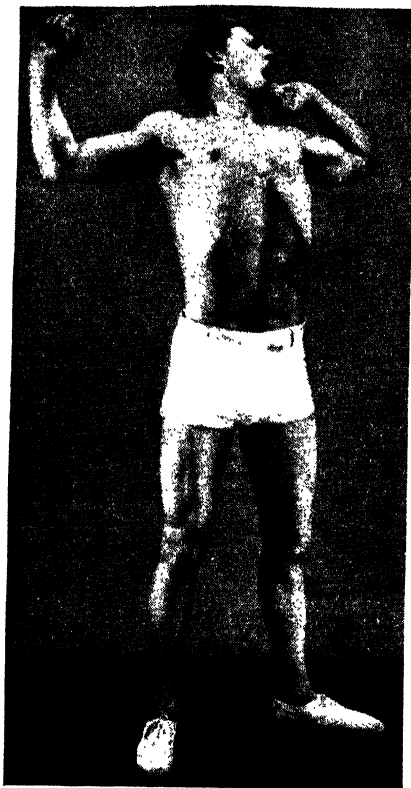
The head may be raised and dropped in the same manner.

Stretching is probably the most natural form of exercise. Animals and babies practice it frequently. Adults who take no other exercise do some stretching instinctively. When one has been inactive for some time there is a strong inclination to stretch. This is Nature's way of making one take a certain amount of exercise. While stretching may seem like a very light form of exercise—and in truth it can be used by the weakest—nevertheless, *whole-hearted stretching can give one a lot of exercise in a short period of time.* Everyone knows instinctively how to perform certain stretching movements, but there will be found to be quite a variety that can be added to these, if one will give a little time to figuring them out. Even those which are known instinctively, however, will do a lot of good if practiced regularly.

**What
Stretching
Does**

Stretching exercises have many constitutional benefits. They call for a strong contraction of certain muscles followed by a complete relaxation. Thus we get the stimulating effects of the contraction and the restful effect of the relaxation. The separation of the joints causes a specially good circulation in these parts and an increased flow of the synovial fluid. The loosening of all the articulations helps to remove any nerve-pressure, and this, with the stretching of the nerves, greatly improves their function. Stretching of the proper kind lifts the chest and the abdominal contents, and counteracts the almost universal tendency to "slump" forward, which is a prominent cause of prolapsus. The alternate strong contractions and complete relaxations not only greatly accelerate the circulation, but improve muscle-control and develop "muscle-sense." Stretching also causes one to breathe more deeply; thus it goes hand in hand with breathing exercises and intensifies their good effects. Owing to all these results and especially to the relief of tension, there is a general feeling of refreshment and well-being after stretching. It should form a part of every exercise regimen.

Stretching exercises may be taken in the standing, sitting or reclining positions; but the last is probably the most natural and most useful position, as it permits the greatest relaxation of the parts not being stretched and enables one to take a greater variety of movements.



Stretching. To relieve the muscles and ligaments from a strained, cramped position, Nature's own method is to yawn and stretch. The cramped muscles of the whole body are thus stretched, while those that were too relaxed are contracted. Men as well as animals indulge in this luxurious exercise after sleep. Any motions will do, the position illustrated being a common and a good one.

The important point to remember in stretching is to carry each movement to the fullest possible extent. In fact, it is this which distinguishes stretching from other forms of exercise. We advise complete movements for all exercise, but in stretching there is a steady and studied effort to carry the principle to the limit. For instance, if one desires to stretch the arm, the limb is extended outward and backward as far as possible, so as to strongly contract the extensor muscles on the back. The extension is then held for a moment until the pull is distinctly felt, then the muscles are relaxed. This method of performing a stretching movement is employed for all such exercises. Very complete relaxation should follow the stretch, and all movements are performed slowly and deliberately, with a pause after each one. The following movements will serve as illustrations.

In standing position: Extend both arms overhead, rise on the toes and stretch upward. Extend both arms sideward, shoulder high, and stretch outward. Clasp hands behind the head and stretch the elbows backward. Thrust the chin as far forward as possible. Bend the head backward as far as possible. Draw the shoulders forward as far as possible, one at a time and both together. With legs spread apart, bend forward and touch the head to the knee. With feet together, bend forward and touch the palms to the floor without bending

the knees. Place one foot on a table or other support at about the height of the hip, then bend forward and touch the head to the raised knee. Repeat with other leg. Bend body to right, raising the ribs on the left side and forcing the right shoulder down. Same, bending to the left. Standing with legs well apart, bend the right knee until sitting on the heel, keeping the left leg extended, then stretch the inside of the left leg by pressing down with the foot and pressing on the knee with the hand. This exercise should be repeated, using the other leg in the same manner. Hanging from a horizontal bar (which can be fixed across the upper part of a bathroom or bedroom or any other door-jam) is excellent also.

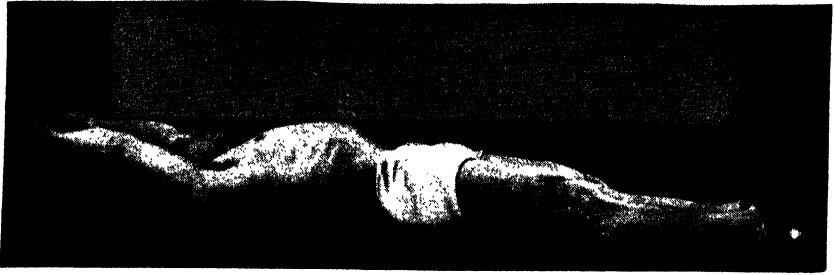
In sitting position: All the above described movements for the upper body can be taken. Keep the feet back under the chair so that it will be easy to sit erect. In addition to these movements bend the body as far forward as possible, getting the head well down between the spread knees. Straddle a chair and throw the weight of the body first to one side, then the other, so as to stretch the insides of the legs. From ordinary sitting position straighten the legs one at a time, tensing the thigh muscles.

**Stretching
While Sitting**

In reclining position: Stretch upward with the arms and downward with the toes. Twist the body to the right, extending the left arm as far as possible to the right. Same to the other side. Raise both legs and touch the toes overhead to whatever support one is lying on. Partly raise the head and shoulders, stretching forward with the arms. Contract all the muscles of the back, arching it so that the weight rests on the head and heels. Do the same after drawing up the knees until the heels are close to the buttocks. Raise both legs to a vertical position, then spread them as far apart as possible, then cross them to the limit. Writhe around like a snake, twisting and contorting all parts of the body in all possible directions, so that all muscles of the trunk get a thorough stretch.

**Stretching
While
Reclining**

The time to stretch is whenever you feel like it, as this is when you need it the most. However, in order to be sure of getting in some of this exercise it is well to make a habit of stretching every morning before getting up and every evening after going to bed. It is good to stretch just before relaxing.



Stretching. The illustration shows a method of using traction to stretch the ligaments and muscular structures. Two heavy objects which may be grasped a few inches above the floor (such as a bed and a chair) are placed with one within reach of the hands and with the other brace the feet as shown. The object is to pull vigorously with the arms so as to stretch the entire body, then to relax and repeat.

It is difficult to overdo stretching, and one can do as much as feels pleasurable. In most cases one will feel refreshed rather than fatigued afterward, though it is possible to generate a mild fatigue by vigorous stretching. This is very good. With someone to assist, all parts of the body can be passively stretched; this may supplement but should not supercede the active stretching. See details on manipulative treatment in Volume VI.

WALKING.—Walking is the most familiar form of constitutional exercise, and the one that we could least afford to dispense with. In value it stands next to breathing exercises and it is closely connected with respiration, for one of the best times to practice deep breathing is while walking. In fact, a brisk walk is certain to produce deep breathing.

Walking gives all the benefits of other forms of constitutional exercises and has some special advantages of its own. The effect of a long walk is particularly marked upon the circulation. The large thigh muscles as they contract and relax press rhythmically upon the great arteries and veins which pass near them, and thus affect the circulation more powerfully than would much greater exertion on the part of smaller muscles. By practicing the squatting exercise a few times anyone can soon prove to himself how quickly movements of the thigh muscles affect the beat of the heart and the speed of the circulation and respiration. The increase in circulation continues for a considerable period of time after the walk is ended.

The effect of walking upon the function of breathing has

already been noted. One cannot walk for any length of time without beginning to breathe more deeply; yet there will be no strain or breathlessness and a large percentage of the oxygen inhaled will be absorbed, since the exercise creates a demand for it. It is well to practice rhythmic breathing while walking. This means to inhale and exhale in a definite rhythm controlled by counting the steps. The exact rhythm to use will vary in individual cases, but inhalation and exhalation should be equal. The usual plan is to inhale for four to six steps, then exhale for four to six steps. Some persons get along better by taking two steps for each inhalation and two for each exhalation. The number of steps can be gradually increased as the lung capacity develops, but will always have to be graduated according to the speed of the walk and its duration. At the start, or when going at moderate speed, it may be easy to count eight steps for both inhalation and exhalation; but after walking awhile or increasing the speed, there will be a demand for more oxygen and the elimination of more carbon dioxide, and breathing will have to be quickened. In this case it may be necessary to cut the number of steps to four. A little experimenting may be needed to determine the rhythm that suits one best, and then after a little practice it will become habitual, and the counting of steps will no longer be necessary. Such rhythmic breathing, while intensifying all the good effects of walking, helps to produce a free, easy, relaxed, balanced stride that carries one over the ground with very little effort.

Rhythm
in Walking

Elimination is another function that is greatly improved by walking, which is one reason for its unusual constitutional benefits. The breathing just discussed is one channel of elimination; the perspiration induced by walking is another. Even though one does not notice any extra perspiration on the skin, an extra amount will have been secreted. The underwear and hose will be found to be slightly damp; also the hatband, if a hat is worn. The constant up-and-down motion of walking stimulates peristaltic action and helps prevent or overcome constipation. A long walk is almost always followed by a desire to defecate.

No one needs experimental proof that walking improves the appetite, and if it does this it must improve the digestion.

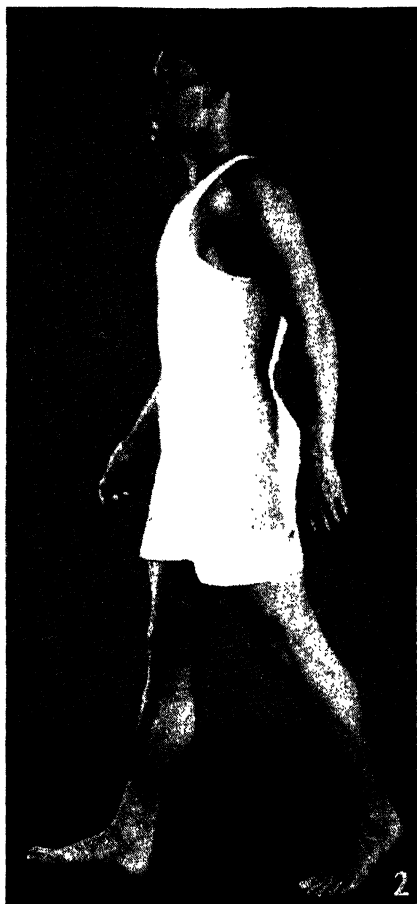
Those who take up regular walking soon notice that all the digestive organs are working better. In fact, there is no part of the body which is not benefited.

Some of the special advantages of walking are these: It is practically always done out of doors where there is fresh air and frequently sunlight. Almost everyone is confined too much indoors and walking helps to overcome the bad effects of such confinement. There are few people who are in a position to take their calisthenics and other exercises outdoors, but everyone can walk in the open. It may be necessary for many walkers to follow more or less the same route every day, but if they cultivate their powers of observation they will find something new each time. This maintains interest and takes the mind off one's cares and troubles. For those who can employ different routes these effects are still more noticeable.

Walking is something that almost everyone can do, from the youngest to the oldest and the weakest to the strongest. It is such a mild exercise and requires so little energy that it can be taken when all other forms of exercise are contraindicated. It can be graduated from a few steps across the room to an all-day walk of 40 miles or more, and from a mere amble to racing speed of five miles an hour. At the same time it is a form of exercise that is very difficult to overdo. When walking for health there are few who will proceed beyond a healthful degree of fatigue; in fact the majority will stop short of this, either for lack of time or of determination, but if one should go beyond the right point no serious damage will result. Recuperation is rapid and perfect, because of the stimulation to all the functions of the body. Even the stiffness of the muscles which follows an unusually long walk soon disappears. So one need never be afraid to walk because one lacks a doctor or trainer to advise as to the exact amount of the exercise that should be taken.

On account of these benefits walking is included in every exercise regimen or training schedule. It is the walking that produces the results obtained from golf. Professional pedestrians are able to continue competition far beyond the age at which most athletes have to quit. This is not because

Can Walking
Be Overdone?



Posture
While
Walking

The correct method of walking. The body is held erect, head in line with it, chest high, abdomen relaxed. The heel of the forward foot should strike the ground as shown, while the weight rests on the ball of the other foot, from which one deliberately propels himself forward by pushing upward from the ground with the toes.

of the mildness of the exercise, for the very long high-speed walks such as they take part in require real strength and endurance. Rather, it is because walking keeps one young by stimulating metabolism—the breaking down and building up of tissues—so that old cells never linger very long in the body and new cells are constantly being built. After every long walk the body will be partly born again, because many new cells will have been built up. On a walk from New York to Chicago, for instance, one would arrive with a body almost entirely different from that with which one started.

Walking as a
Weight
Regulator

For the reasons just mentioned walking also tends to normalize the weight, as long as one is reasonably careful with the diet. Those who are underweight will gain, because of the demand for extra tissue created by the exercise and the supply of that demand by an improved appetite and digestion. Those who are overweight will lose, because the exercise burns up the fat and causes the body to utilize the incoming food material to build muscle instead of adipose tissue. While an increase of appetite will be noted at first, the body, if one lives on a properly balanced reducing diet, will soon become accustomed to using the stored material on hand and the appetite will subside to the point just sufficient to call for the new elements required. It has also been claimed that walking is of value for increasing the height, but while it has no doubt had this effect in many cases it cannot be called a guaranteed specific.

But just what is walking? This may seem like a foolish question, as everyone is presumed to know what walking is, but many people think that as long as they keep putting one foot before the other they are walking. To be sure they are, to a certain extent, but walking which is to be of any value must be done briskly and in just the right manner. There is a difference between walking and strolling. The latter is beneficial to a limited extent, but cannot compare with real walking. Only when one is so weak from some diseased condition that such mild perambulations require real exertion can they be considered walking.

One is supposed to learn to walk instinctively when a child, but the number of people who walk incorrectly is sufficient proof that a little special instruction would have been well worth while. There is a right and a wrong way to walk and all parents should see that their children are properly instructed, and should be careful to set a good example themselves. The use of improper shoes is one reason for many faults in walking, and both children and adults should always wear shoes shaped like the normal foot, with low heels or no heels at all.

The first thing to which attention should be given is the position of the spine. While there is a certain natural tendency to stand erect when walking, most people are so careless of



PHOTOGRAPH WIDE WORLD—UNDERWOOD & UNDERWOOD

PLATE 37. Group of English walking enthusiasts on the open road, contrasted with cyclist (in inset) of a past generation.

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their posture that they are not likely to maintain a correct carriage at any time without giving the matter some conscious attention. A good method of getting the spine straight is to keep the chest up. The spine should not be stiff, nor should it "lean backward," but it should be so held as to keep the chest and the head up. Drawing the chin back somewhat is helpful. Always avoid tension, however, as there must be sufficient flexibility to allow a free swing of the body. It is seldom necessary to give any attention to the shoulders when the points already mentioned are observed. Some people need to be cautioned, however, not to raise the shoulders when raising the chest; they should be kept back but down. When the arm swings forward the shoulder will also move forward to some extent, but when the arm goes backward the shoulder should also go well back.

Having assumed the proper posture attention should be given to the stride. The most important point here is relaxation. There should be no stiffness or tension, just a free, relaxed, easy swing. This is brought about by several factors. The legs should be swung forward from the hips so as to lengthen the stride, because a fairly long stride permits greater relaxation, covers more distance and gives more exercise. As the leg goes forward the arm and shoulder on the same side should move backward, so that there is some rotation of the body with each stride. The heel should come down first, but the ball of the foot reaches the ground very quickly after the heel, and as the body moves forward the weight comes on this part of the foot and the toes, so that a little extra push forward can be given at the end of the stride.

**Walking
Stride**

In order to make the most of each stride and to prevent damage to the foot, it is necessary to keep the toes pointing straight forward when walking. If they are allowed to turn in or out, some of the power and spring is lost from the stride. In addition some of the muscles are strained, others are not used at all, and unusual pressure is brought to bear on the bones, so that the arches are weakened. Walking with the toes turned out is a frequent cause for fallen arches. It also predisposes to knock-knee. One does not usually walk with the toes turned in unless bow-legged to some degree. This is not so hard on the arches, but it is awkward and inefficient.

The exact length of the stride will, of course, vary with the individual. There is a stride that is natural to each individual, and this will soon be discovered when walking in the manner described. Some short people have a long stride and some tall people have a comparatively short stride, but each has a stride that is natural to him. Each step should be a sort of falling forward. One should have the impression that each step prevents him from losing his balance. The body is allowed to incline forward still keeping the spine straight so as to heighten the effect of falling. This keeps the legs constantly moving forward so as to maintain the equilibrium and is conducive to a long vigorous stride. The point, however, should not be carried to an extreme.

There may be a little stiffness and incoordination when first giving attention to the posture and stride, just as there is much awkwardness when learning to swim, but this will soon pass. One should not attempt to walk very fast until the proper manner of walking has become habitual, so that no special thought need be given it. This is necessary in order that there may be relaxation.

Walking for
Speed

When all parts of the body work together smoothly, so that there is no tension and legs and body adapt themselves to the inequalities of the road without jarring the spine, one will be ready to consider speed. At this time it will be found that the speed is greater than formerly and no further increase is especially necessary, but if one desires there may be a gradual increase as long as there is no sacrifice of proper stride and relaxation. Speed always tends to produce tension and it takes considerable practice to walk fast in the proper manner. Therefore the increase must be made gradually. For all ordinary purposes three and a half miles per hour is fast enough to walk. If one is vigorous and desires more exercise, this can be increased to four miles an hour. It will be an exceptional person who can go faster for any length of time. The short speed-walks of professional competition cannot be considered constitutional exercise, and have no place in the regimen of the ordinary person. Such walking does develop the leg muscles, but there is almost certain to be some tension, with resulting interference with circulation.

It will be impossible to walk correctly if one is hampered



Upper photographs show forward inclination of body.

While the legs may seem to perform the larger share of bodily motion in walking, the upper body and the back, particularly, are involved with every step.



Lower photographs show movements in fast walking



In fast and vigorous walking may be noted the rotation of the body from the waist which brings not only the body's large muscles, but the spinal region into play.



with tight clothes and stiff unyielding shoes. When walking for health the clothing should be as light and comfortable as possible. In cold weather, wear just enough to keep warm. Shirt and trousers, or waist and knickers, will be sufficient in warm weather; underclothing, hose and sweater can be added in cold weather. Tight collars should never be worn. Hats are unnecessary unless the sun is very powerful, and under such conditions it is better, if at all possible, to walk early, or late in the day. In extremely cold weather a woolen cap, muffler and mittens may be required. When hose are worn, wool is best. It is all right to start out feeling a little cool, as the exercise will soon raise the temperature.

What to
Wear When
Walking

Shoes are the most important part of one's walking equipment. Sometimes this problem is easily solved by going barefoot, and whenever it is possible to do so it will be found a healthful practice. However, it must be started gradually, so that the feet will be hardened a little at a time and uncomfortable blisters avoided. In most cases, going barefoot will be possible only on dirt roads in the country, or the sand at the seashore. Paved roads are too hard and gravel is too stony. Park walks are generally paved or graveled, but if the laws permit walking on the grass this will be satisfactory. If unable to go barefoot the next best plan is to wear sandals. They should cover the toes, but otherwise should be as open as possible.

The sandal, of all footgear, allows the maximum of foot freedom and ventilation, and with woolen stockings it can be worn even in quite cold weather, as the walking keeps the circulation active in the foot and thus maintains warmth. If sandals are not available, or the roads are too rough and rocky to permit their use, a soft shoe with a pliable leather sole may be worn. Gymnasium shoes are often satisfactory. They should not be close-fitting, in order that the foot may have full freedom of action and room to swell as the blood-vessels dilate and fill with blood. Neither should they be so large that they slip up and down on the feet and cause blisters. Whenever shoes of any kind are worn it is also necessary to wear stockings, and the woolen ones suggested will be found helpful in taking up friction and absorbing perspiration. When going on a long hike of days or weeks, during which all

kinds of roads will be encountered, it is generally best to use a fairly stout shoe built with a good broad toe and low heel. Good hunting and hiking shoes can now be obtained in all of the larger sporting-goods stores. One can take along a pair of sandals to use for a change when the roads permit. Some may have to experiment a little to discover the exact form of footwear that suits their needs the best; but the shape should always be as nearly as possible like the foot, and every part should be as soft and flexible as is consistent with strength and protection.

Walking is an exercise which can, however, be taken at any time of the day, even directly after meals, as long as the meal is not too heavy. It can be taken before or after exercise, or before retiring. Many persons find that a walk before going to bed helps them to sleep. Of course, walking at night is not as good as in the daytime, when one can have sunlight, but it is better than no walking at all, and there is no objection to an additional walk before retiring, even though one has had one or more walks during the day. Walk whenever you have the opportunity, and your health is bound to improve.

Walking by
Day and
Night

Do not let the weather deter you. One can walk with benefit in any weather as long as proper clothing is worn, and once one becomes accustomed to walking in all weathers one will come to enjoy it. In rainy weather a rubber hat and coat may be used, though the hat, especially, is not necessary. It is better not to wear overshoes unless it is impossible to change at the end of the walk. It doesn't hurt to get a little wet, as long as one is active and can change to dry clothing when the activity ceases. There is a pleasure in feeling the rain on one's face that few people appreciate, because they have never given it a fair trial. Other variations in the weather also have their advantages. Wind is excellent for stimulating skin action and deep breathing, and for "blowing the cobwebs out of one's brain." Cold air is a wonderful tonic and is generally purer than warm air, though warm air has the advantage of increasing elimination through perspiration. There is only one thing that need disturb the walker and that is dust. If it is excessive it is better to wait until the wind subsides, or to walk in the early morning when the dew has laid the dust to a certain extent.

**Distance in
Walking**

The final problem in walking is distance. We are constantly receiving inquiries from those who wish to know how far they should walk each day. This is one point on which it is difficult to give specific directions, as it is an individual matter. It depends upon the health and strength, the occupation, the amount of other exercise taken, the speed of the walks and the character of the country, and, naturally, the amount needed by each individual will vary from day to day with his changing ground conditions. It may be stated that practically everyone can accomplish three miles a day, and that for most from three to five is a good distance. One can take more than is actually needed without harm, but not less without losing to some extent.

Those unaccustomed to walking, however, must approach the standard mentioned gradually. The points covered in *How to Exercise*, page 1024, all apply to walking.

EXERCISE FOR PHYSICAL DEVELOPMENT

Section 4

MOST people require a certain amount of developmental exercise if they are to be at their best, even though the constitutional variety is enough to maintain health, because there are few who are not lacking in strength or symmetry in some parts of their bodies, and the only way to improve the power and appearance of these parts is to change the size of the muscles through developmental exercises. Such exercises also have constitutional effects, as explained in other sections of this volume and other volumes of this work, so they have a double value. Some people are naturally more favored in their bodily proportions than others, especially as regards the bony framework which determines the height, length of limbs, length and breadth of trunk and depth of chest, all of which have an important bearing on the general appearance. These parts cannot be changed except to a slight degree by muscular exercise, particularly after maturity; but by a careful and proper development of the muscles one can make the most of strong points and minimize weak ones, while at the same time building health and strength.

Developing
Normal
Proportions

Beauty of form, both feminine and masculine, together with strength above the average, is well worth working for and can be obtained even though one has no special advantage in the way of gymnasium or schools of physical education. The body beautiful is not, however, properly appreciated as a rule.

Anthropometry is of interest and value here as the scientific study of the proportions of the human physique in both men and women. While it is a familiar fact that no two men and women are proportioned exactly alike, there are standards by which the relation of body weight to height and the relative proportion of the various parts of the body may be judged for their appeal to the average human eye. This subject is discussed in Volume V, under Physical Aspects of Personality.

Strength as
an Asset

Even if one is not especially interested in beauty of form, there is no denying the advantages of strength. Strength gives one self-confidence, as it is associated with an instinctive feeling of being able to take care of oneself. The more strength one has the less is one likely to fear anything. Strength gives one the ability to work, and what is more, the desire to work. This applies to either mental or physical labor; for one cannot think clearly, or concentrate for long periods, unless one is full of energy, has a good circulation and pure blood, and all of these things are associated with superior strength. The feeling of power produced by the possession of strength makes one more dynamic, more ambitious and more qualified for leadership.

Brains are supposed to be the chief necessity for success in modern life, and they *are* necessary; but anyone who understands the physiology of the body knows that the brain cannot be at its best if the rest of the body is below par, and this includes the muscular system. Most successful men have good muscular systems built up in their youth. They may neglect themselves later and still be successful, but in this case they usually die young, in this respect proving failures instead of successes. Only those who build a good foundation in their youth, and then continue to give some attention to their muscles, will be truly and continuously successful, for muscular exercise is an indispensable part of the regimen required to maintain health; also real strength of the internal organs cannot be produced without at the same time building strength of muscle, and without both health and strength one cannot build much on the real foundation of success which is *work*.

Strength
and
Self-defense

Valuable as strength is for increasing general efficiency, it is probably most valuable as a means of protection in emergencies. To be able either to fight or take to flight when necessary is a valuable accomplishment. To be able to handle the body in any position and to support its weight by the arms for considerable periods of time, to be able to move quickly and powerfully and to have full control over every muscle, may mean the difference between life and death. This is especially true in certain occupations, but applies to everyone, as we are all exposed more or less to accident. Moreover, if injury from accident does occur, the strong man recovers more quickly.

The possession of strength, even though one may not consider it very necessary, can certainly never do any harm, and it should not be difficult to take enough developmental exercise to produce a degree of it at least somewhat above the average, for the average man or woman is not conspicuous for muscular strength.

The process by which such development is brought about has been described earlier in this volume. Progression is the cardinal principle. A constantly increasing bulk and strength of muscle can be created only by constantly increasing exercise.

Once able to do constitutional exercises easily, the resistance is gradually increased, first by using the weight of the body and later by means of apparatus. Apparatus is therefore particularly helpful in the development of one's maximum bulk and strength of muscle. Resistance and tensing exercises will produce an excellent development, but they have their limitations when compared with dumb-bells, bar-bells, steel-springs, elastic-cords, pliable steel-bars and other forms of apparatus.

The heavier exercises with apparatus are not especially indicated for persons younger than eighteen or older than fifty. Previous to the age of eighteen constitutional exercises and competitive sports will supply the needs of most cases, while, if one has not taken any developmental exercises up to the age of fifty, it would be better to limit oneself to constitutional exercises thereafter. A person organically sound, if he starts carefully and increases his exertions slowly, can work up to the point where heavy developmental exercises could be used, even after fifty; but the advanced constitutional exercises are generally sufficient, and in later life one does not have quite the same capacity for development that a younger person would have.

**Exercise
After 50**

Developmental exercises with heavy apparatus should never be permitted before the age of fourteen, as they are not needed and there is too much danger of strain. In exceptional cases some such exercise might be permitted between the ages of fourteen and eighteen, but it is generally better to omit it. If the proper exercise is taken during these periods, and some developmental exercise added thereafter and employed up to forty years or so, constitutional exercise will

then generally be sufficient to maintain a good percentage of the bulk and strength of muscle thereby secured. Certainly this development will lay an excellent foundation for better health and more energy during middle life and later.

Developmental exercises are not for sick people. The thing for them to do first is to get well. Then they can take a normal regimen of constitutional exercise before considering anything heavier.

The time to take developmental exercise is much the same as for any other form of exercise, as explained under *When to Exercise*, page 1010. However, there are two points that need special attention and some modification. The middle of the afternoon is the best time for such exercise from the standpoint of bodily energy; but the next best is the evening. These heavy exercises require considerable energy, and one is in a better position in the evening after the day's work is done to determine how much energy is left to expend on the movements. Never forget that exercise is of value only when enough energy is left to produce recuperation. In the evening one can go to bed shortly or immediately after the exercise and secure the rest that is so necessary for the building of the new, larger and stronger muscle-cells.

As to the frequency of the exercise, three days a week is sufficient at the start for the majority. A longer period is required for recuperation from heavy exercise than from light. This is only to be expected. When noticeable progress has been made the frequency can be increased to four times per week, and if one is training for the maximum development five times per week may finally be permitted. But one never gets anywhere by overdoing. Sometimes it is well to rest one week after every six weeks. One must always be guided by one's own powers of recuperation. These may vary considerably in different individuals and even at different times in the same individual, for we use energy for many things besides muscular exercise.

Many people think that it is permissible to eat heavier meals when doing heavy work. To a certain extent this is correct, since more building material is needed, but this does not mean that one may overeat. Overeating always wastes energy and when we wish to use our energy for development

we cannot afford to waste it in eliminating unwanted and unneeded food. Therefore on "feast" days take less exercise, and also eat more lightly on the following day. The same applies to loss of sleep. We have already seen how important sleep is as a supplement to exercise, so if for some reason one does not get one's usual amount of sleep less exercise should be taken on that day. One should avoid as much as possible, however, these interferences with the usual developmental regimen.

Corrective
Exercises

The exact method of performing the various developmental exercises will be taken up in detail under the specific headings hereafter listed. However, the general rules for all exercises will apply. It is always best to start with the lighter movements and increase gradually, to pause briefly between movements, to combine the exercises with deep breathing, to rest afterward and do all the things already covered under *How to Exercise*, page 1024. Since developmental exercises require, in addition to muscle, considerable effort of the will, they are always done somewhat more slowly than other exercises. That is, the movement itself is slower and there is more of a pause between movements, in order to prevent too great disturbance of the normal rhythm of the heart and lungs. Some of the heaviest movements require fixation of the thorax, which in turn shuts off the breathing, so there must be a longer period of rest between movements to catch up on breathing. Slower movements also permit greater mental concentration, which favors development. Another important point gained is that there will be less likelihood of strain. Even when one has a good development there is more or less danger of strain when doing heavy exercise. A little chilliness or stiffness, a slight change in position, or slip of the foot, may be enough to bring about a strain, but when the movements are done slowly there is much less danger. Certain weight-lifting movements must be done with a jerk, and this of course requires speed. The "slowness" of the movement in this case is in careful preparation for the lift and rest afterward. As a rule one can be guided by one's feelings as to the proper speed for each movement. It must not be inferred that all heavy exercises should be performed after the fashion of slow-motion moving-pictures, but there should be no rush

or hurry, each movement being performed with sufficient deliberation to permit good form.

Developmental Exercises
Slower

As the developmental movements are performed more slowly than others, so should the rate of progression be slower. Do not be in a hurry to demonstrate feats of strength and show how strong you are. Be content to advance slowly. In the end one will get there more quickly, for delays occasioned by strains and overtraining will be avoided. If a strain does occur, it is well to rest for a few days until the tissues have had a chance to heal, and then begin again more gradually. Continuing to exercise a strained part may result in chronic weakness. Overtraining, or trying to do too much, exhausts the nervous energy and this also calls for rest. The only wise plan is to be guided by your own capabilities and not try to follow any rigid rules.

Because a good many people have failed to observe these cautions and have had more or less trouble as a result, many objections to heavy exercise have been made. When performed in the proper manner, however, there can be no danger in or bad effects from such exercise.

One of the commonest of these objections is that heavy exercise tends to make one muscle-bound. This means that the muscles are shortened, so that the movement of the joints is limited and a certain degree of stiffness is thereby produced. This arises, however, not from the exercise, but from the failure to carry each movement to its fullest extent. When this is done and the movements performed in the manner recommended, one need have no fear of becoming muscle-bound.

Over-development

The development of large muscles is also supposed to reduce speed and, of course, if no quick movements are ever taken, one will be slow. This tendency is readily overcome by combining the developmental exercises with constitutional ones, as already recommended. It is not the large muscles which reduce speed, for strength is necessary to speed. A good example would be the legs of a sprinter. The muscles are usually large and strong and yet the runner is speedier than a long-distance runner whose legs may be smaller. It is practice that makes one fast or slow.

Another bugbear held before the eyes of those who would take up heavy exercise is over-development. Dire predictions

are made that the muscles will become so large that they will sap all the vitality and lower the resistance to disease. The powerfully-muscled man is looked upon as a freak and is expected to die young. Perhaps he will, but it will not be because he has large muscles. In fact, since exercise improves all the functions of the body, he is likely to live longer than he otherwise would have done. This idea is based on the assumption that we have a certain amount of vitality to use, like money in the bank, and when it is exhausted no more will be forthcoming; which is, of course, absurd, as one cannot develop beyond one's natural limitations. An unbalanced development is possible, but only if one does not train correctly.

Heavy exercise is also supposed to be hard on the heart, and naturally it is harder on this organ than light exercise, but if properly graduated from the light to the heavy the heart will be developed in the process and there will be no strain. The heart of an athlete is always larger and the muscle-cells stronger than in others. This is physiological, not pathological.

Effects of
Heavy
Exercise

It has been found by experiment that the rate of the heart-beat increases rapidly when taking exercise, but it also returns rapidly to normal after a short rest. As a general thing the pulse-rate of an athlete in training is slower than that of the average person. This is because the heart is stronger and can handle more blood at a time, thus making it necessary to beat so fast. The blood-pressure may rise when one takes heavy exercise regularly, but this is not due to any bad effects on the heart or arteries but to the stimulation of the circulation and the extra activity of the adrenal glands. The blood-pressure always rises along with the pulse under the influence of exercise, but it does not so quickly return to normal and has a tendency to stay somewhat above its former level. This also is physiological.

It is claimed further that heavy exercise inclines one to heart-failure, but no one is able to explain why a stronger heart such as is built by proper exercise should be more inclined to "failure" than an ordinary one, and statistics indicate the contrary. Investigation of the lives of college athletes disclosed the fact that they lived longer than their classmates who took no part in athletics. Those persons who develop large muscles and yet die young do so not because of the muscles or

the exercise taken to produce them, but because of dietetic errors, dissipation of various kinds, or other wrong habits of living.

These same bad habits are responsible for the weakening of sexual power which is often blamed on the development of large muscles. The same reasons are advanced for this claim as for the supposed shortening of life through heart-failure, but none of them will bear careful analysis. The old idea that one part of the body can be developed only at the expense of another part has no foundation. All parts of the body are closely connected through the nervous system. They are dependent upon each other and, consequently, what helps or injures one part will help or injure another. The factors required to develop big muscles—exercise, rest, proper diet, deep breathing and so forth—also improve every other part of the body.

There is one other reason that is sometimes given for not taking heavy exercise, and that is that it produces “bunchy” muscles. This is an esthetic objection. “Bunchy” muscles are just as efficient and often more so than other kinds, but some people think they do not look as well. The truth of the matter is that in those types that develop short rounded muscles, such muscles are not out of balance. Moreover, by combining the developmental exercises with stretching and other light movements, a smoother development may be obtained even in these cases. Even if nothing could be done about the matter, the benefits of health and strength far outweigh any esthetic considerations. These are merely matters of personal preference.

There are no real objections to the use of heavy developmental exercises if one desires to use them. It is not advisable, however, to work for any exceptional development that one does not expect to use and which will be neglected after it is obtained. Such neglected development, including that of the organs, is inclined to lead to fatty degeneration, especially if the diet is not adapted to the changed habits of living, and then one is in danger of various chronic diseases. The thing to do is to develop just what you are going to need, and if your needs are later reduced, to gradually reduce the amount of exercise and the amount of food taken, so that the body can adapt itself without injury to the changed conditions. Those

honestly interested in perfecting their bodies will find the developmental exercises very necessary and very interesting, and when they see the progress they make it will be sufficient proof that only benefit results from this form of muscular activity.

In enumerating the various developmental exercises those will be taken up first which are designed to improve the symmetry of the various parts of the body and to produce a moderate degree of muscular bulk and strength. The movements, of course, are the lighter ones. They are not unlike the more strenuous constitutional exercises, especially floor calisthenics, but there is usually some special feature about each one that marks it as a developmental exercise.

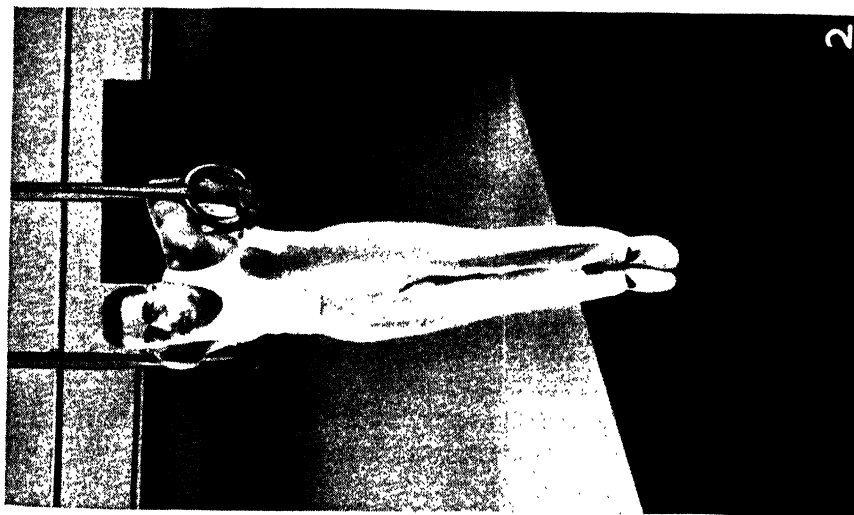
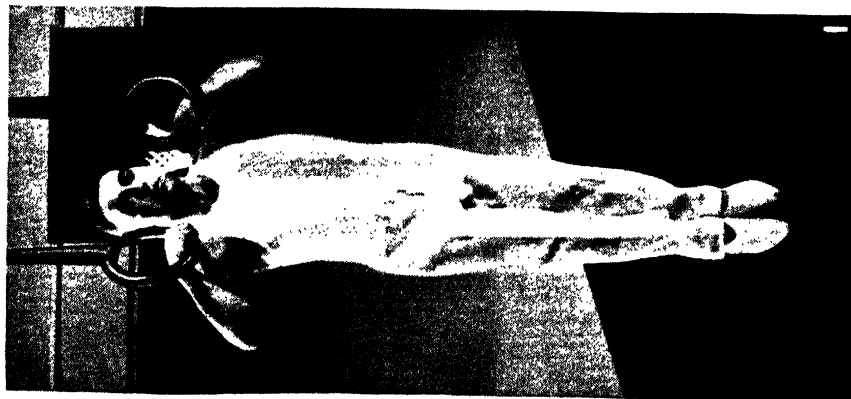
**Exercise for
Development**

APPARATUS WORK AND GYMNASTICS.—Discussion of exercise for physical development leads to consideration of the apparatus used in the modern gymnasium and its uses in upbuilding the physique. When exercise outdoors is impracticable, for any of numerous reasons that may exist, gymnasium work is next in value to exercise in the open air.

It is true that the physical instructor depends primarily upon games and class drills, as described in Section 6 of this volume, for general physical upbuilding. Yet, just as certain forms of competitive sports and games hold the interest and arouse the energies quite apart from the physical return afforded, apparatus work holds an added interest for many. Indeed apparatus work is a sort of post-graduate form of physical training. It is from those skilled in such advanced gymnastics that physical instructors usually are recruited.

Through many leaders of physical training, notably the late Dr. Dudley A. Sargent, many useful exercise devices have been handed down to the modern gymnasium. Among these may be mentioned the rowing-machine, the stationary-bicycle, the walking-machine and others. Different gymnasia naturally vary in their equipment of this sort.

For the most part, the most popular and effective gymnastic apparatus work is performed on the rings, the horizontal bar, the high and low parallel bars and the vaulting horse. Illustrations and descriptions of work on these and other forms of apparatus, also of tumbling, are included in the pages that follow.



EXERCISES ON RINGS. (See next page.)

RING EXERCISES

1. *Bent Arm Hang.* Grip the rings and pull the body up into the position illustrated. (a) From this position extend the right arm sideways and level with the shoulder, keeping the other arm flexed. Return to first position. Alternate by making the same movement with the left arm. (b) From the illustrated position, press up to that shown in Exercise 2, by first raising the left elbow above the wrist, then the right. Return to the original position in the same manner. Then alternate by beginning on the right side of the body.
2. *Shoulder Hang.* Bring body from position in first illustration to that in the second by method described under (b) or by giving a quick hard jerk with the arms, which will lift the body and permit the arms to shift position so that the elbows come above the wrists. Now flex the knees and thighs, bring the head forward and downward, raise the hips and back, and bring the feet over so that a somersault is turned. Reverse by raising the legs above the head and going slowly back to the position illustrated. From first position one can also press the body straight upward by extending the arms.
3. *Hand Hang.* Hang from the rings as illustrated resting the feet on the tips of the toes. (a) Circumduct the hips to the left; that is swing the body round in a circle, using the toes as a pivot, and making the largest circle with the hips, which should be used as the propeller of the movement. Reverse. (b) Hang from the rings with toes clear of the floor. Describe a large circle with the feet, keeping the legs straight and performing the movement from the hips; first left, then right.

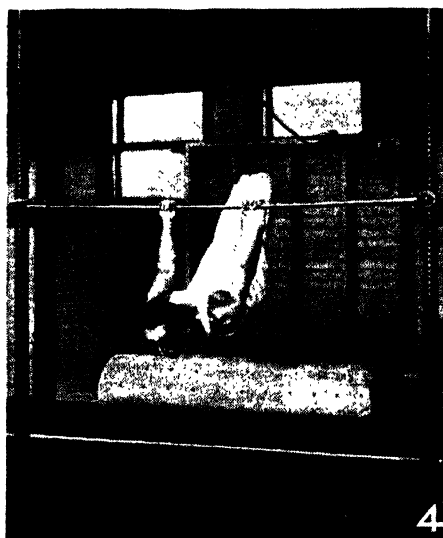
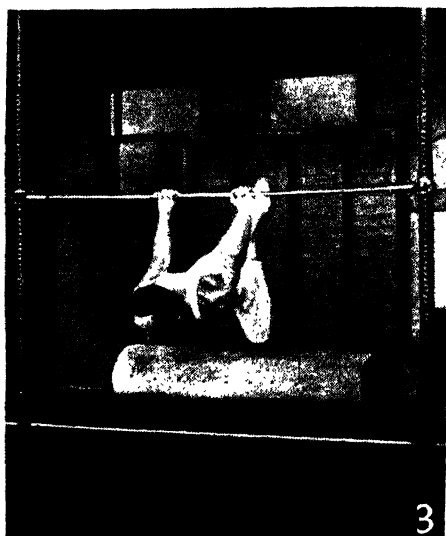
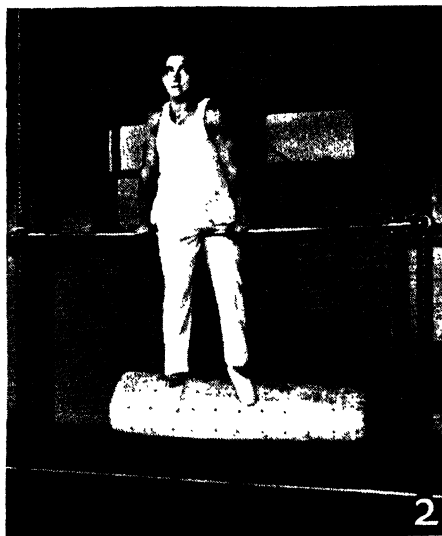


RING EXERCISES. (Full description of movements appears on the following page.)

RING EXERCISES

1. *The Kip Position.* From full arm hang the legs are raised up, and over the body, to the position here shown. From this position, the legs are kicked forcibly upward and obliquely outward, then downward, their momentum causing the body to rise to erect position, supported on the vertically extended arms. This movement must be performed with snap and vigor.
2. *Bird's Nest.* Grasp the rings with both hands, then raise the legs forward upward until the toes can be inserted in the rings. Now bring the hips forward between the arms till the back forms the arch here illustrated. For dismount, return the hips between the arms, unhook the toes and drop the legs to first position.
3. (a) *Knee Hang.* The ropes are grasped above the rings and the legs are raised and inserted through the rings until the latter are under the knees, which must be kept firmly flexed. The hand hold is then released and the body is allowed to swing into the position illustrated. One can swing backward and forward in this position or lift the body to the riding seat position.
3. (b) *Knee Swing.* Now swing the body forward and up till the ropes can be grasped by the hands, and pull up to the sitting position. Then swing forward the arms between the ropes, grasping the rings with the hands and roll forward pulling the feet clear of the rings, and turn somersault to the ground.

1136 HORIZONTAL BAR EXERCISES



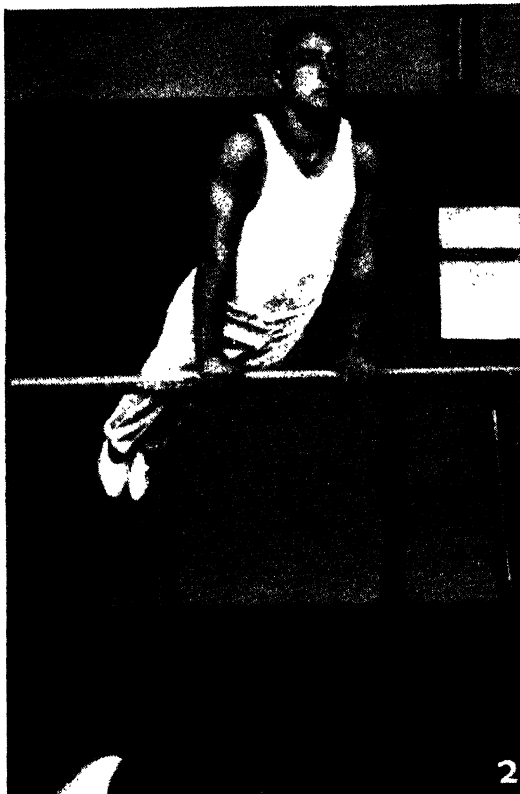
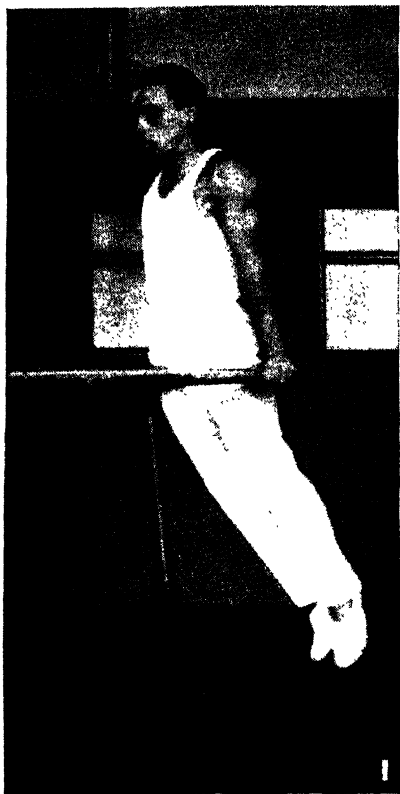
THE HORIZONTAL BAR

1. *Front Rest Position.* From this position, various movements may be performed such as the forward circle, in which the body turns forward around the bar, while being held rigid; the forward lever, in which the body is held in a rigid horizontal position with legs pointing forward while hanging under the bar on the extended arms; the handstand on the bar; and the giant swing, in which the body circles the bar at arm's length. The latter is a very advanced exercise so should not be attempted by beginners. This position is generally assumed by a kip

THE HORIZONTAL BAR (*Continued*)

mount. Hang from the bar with both hands, then draw the body up until the chin touches the bar, at the same time raising the legs to horizontal position. Now let the body drop back to the arm, hang and shoot the legs forward. The body will then swing backward at arms' length. At the conclusion of this swing flex the arms and draw up the legs as before, shooting them forward so as to increase the momentum. Repeat the swing several times until considerable momentum is acquired, then on a forward swing, raise the legs until the toes touch the bar and as the body starts to swing backward, straighten it with a snap and give a powerful tug with the arms, and the body will shoot up to front rest position. It is important to keep the elbows and knees rigid.

2. *A Stride Mount.* From front rest position, pass the right leg over the bar. From this position a backward circle around the bar may be performed as follows: Grip the bar firmly and throw the body backward, at the same time hooking the right knee around the bar. The left knee is held rigid. The force of the backward throw plus the weight of the body will cause the body to drop with sufficient momentum to carry it completely around the bar and back up to first position. It is important to keep the elbows rigid and the right knee well flexed. The same exercise is then performed with the other leg. For a forward circle from the stride mount, the position of the hands is reversed, having the palms facing forward.
3. *Exercise Leading up to the Back Lever.* Assume sitting position with hands gripping the bar, palms forward. Keeping the entire body rigid and straight, allow it to turn backward around the bar until it reaches the perpendicular position with feet up. Then slowly lower the legs and body from the shoulders, keeping the hips straight. As the body approaches horizontal position, draw up one knee, then the other so as to reduce the strain on the shoulders. Then practice extending one leg at a time and finally both together as in 4.
4. *The Back Lever.* This may be approached as described under 3 until one can do it with reasonable ease. Then it can be assumed by dropping slowly from the perpendicular position without drawing up the knees, keeping the legs and body rigid throughout the entire movement and until the body reaches the horizontal position. This is held only briefly, after which the body is allowed to continue to drop until the feet touch the floor, releasing the grip with the hands in time to come down in the erect position.



HIGH PARALLEL BARS. (For description of movements see following page.)
1188

HIGH PARALLEL BARS

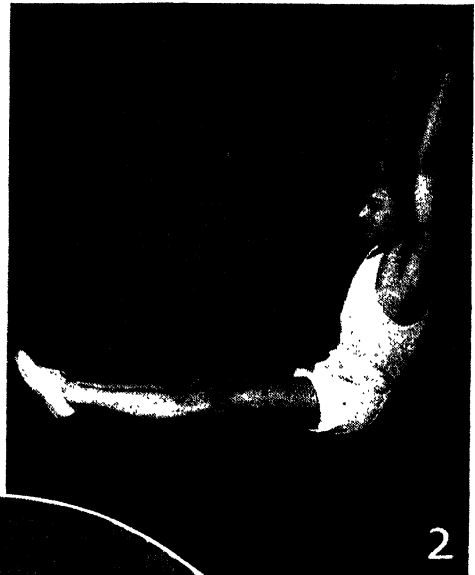
1. *Front Arm Rest.* The initial position from which many of the exercises on the bars begin. This is assumed by gripping the bars near the end, while standing facing them. A spring, keeping the elbows rigid, then carries one up to the front rest position. Still keeping the elbows rigid, the hands may be moved along the bars in the same way as one walks, or may be moved together making small jumps or hops along the bar. From this position also the legs may be swung up to straddle position, right and left hand cut offs may be executed, and various other movements performed.
2. *Front Leaning Rest.* A cross bar position, in which the legs are resting on one bar while the hands grasp the other as illustrated. This is the starting position for various vaulting, stretching, straddling and other movements such as leg circles, which are performed as follows: Swing the right leg outward and over the bar on which it rests, then down between the bars and back up and over the bar to the left and under the other leg to position shown. The left leg is raised sufficiently to permit the passage of the right by means of a quick upward jerk of the body. Reverse the movement by swinging the other leg over the bar.
3. *Shoulder Rest or Stand.* This is another position from which several movements may be started, such as the forward and backward rolls, push-up to handstand and side dismounts. This position may be assumed from a reclining position on the bars by raising the legs and then straightening the body, or from a standing position between the bars by a quick jump and lift of the hips followed by straightening of the legs and body as the shoulders come to rest on the bars.



LOW PARALLEL BARS. (For description of movements see following page.)

LOW PARALLEL BARS

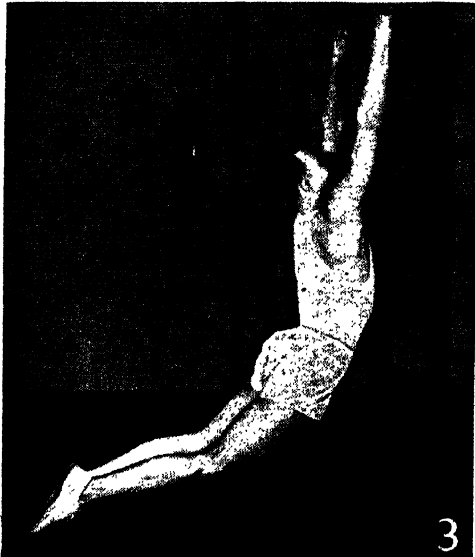
1. Grip both bars while standing between them and perform a hand stand. Instead of walking along the bars on the hands, if you are right handed, let go hold with the left hand, turn body quickly to the right, supporting the weight on the right wrist, and take hold with the left hand on the same bar as the right; then drop the limbs forward, landing on the feet. This is difficult so one must be an adept in hand balancing on the floor before attempting it.
2. Grip the bars at one end as illustrated and perform a hand stand. While in the inverted position, walk on the hands backward and forward, finishing by a somersault to the floor. This exercise may be varied by a one hand stand; that is, having attained the position illustrated, let go hold with one hand, supporting the weight on the other and use the free hand to maintain balance.
3. Stand facing the bars from the side and grip the near bar with the left hand and the farther with the right. Bend forward and rest the body on the left elbow as here shown. Then raise the legs to horizontal position, supporting the weight on the elbow. When balance has been attained, let go hold with the right hand, balancing entirely on the left. Vary the exercise by taking the position on the right elbow.



**STALL
BARS**



**SIMPLE
HOLDS**

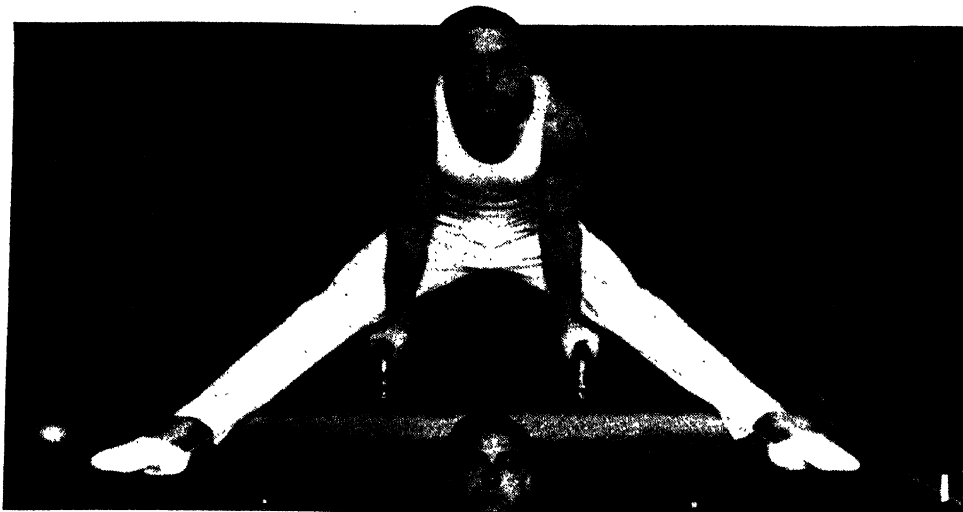


The stall-bars are excellent to provide a means of exercise when posture especially is to be corrected or improved, though they also provide a means for fairly strenuous developing exercise. A variety of movements may be performed on them, involving chiefly the arms, or the legs, or the trunk. All the movements are excellent stretching exercises.

(Full description of movements appears on following page.)

STALL-BARS

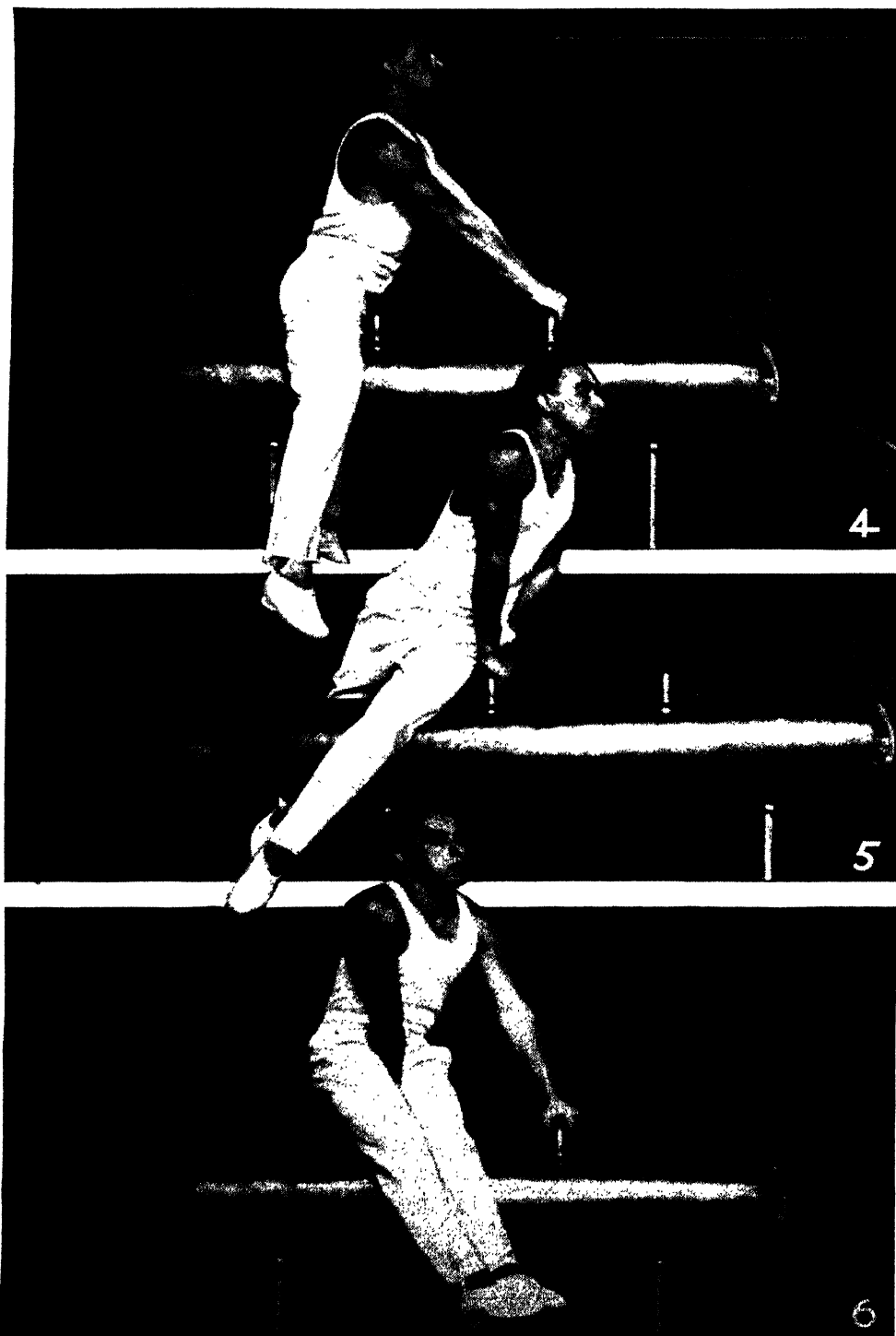
1. Illustrates one of the best ways of stretching the left side of the body. Stand with the left side toward the bars and hook the left foot under the second bar. The hands are locked behind the head. The body is then stretched outward from the bars as far as possible and then swung slightly back again—a kind of pendulum movement—kept up till slightly tired. The right foot is then inserted between the bars and the right side of the body stretched in the same manner.
2. This is an excellent exercise for developing the abdominal muscles, increasing the height, and correcting any tendency to sway back. Hang from the upper bars at arms' length, facing outward, then raise the legs at right angles to the body; then lower. Keep the legs straight and toes pointed. These movements are repeated from 5 to 20 times.
3. For developing all the waist muscles. Hang from the upper bars at arms' length, facing inward, then (a) raise the legs backward as far as possible. Lower and repeat. (b) Now supporting the greater part of the weight from the arms, but with toes on the floor, circumduct the hips, using the toes as a pivot. These circles are made from 10 to 20 times, first to the left, then to the right.
4. For the abdominal and shoulder muscles. An easy method of doing the backward bend. The stall-bars are grasped as in the illustration; and then the hands are lowered bar by bar till as near the ground as possible; then the first position is resumed by moving the hands, bar by bar, upwards.
5. An all round exercise, affecting especially the abdominal muscles. Sit upon a small stool, facing the bars. The feet are wedged under the lower bar. The hands are clasped behind the head. The body is now bent backward to the position illustrated; then raised and bent forward as far as possible. Repeat 5 to 20 times.



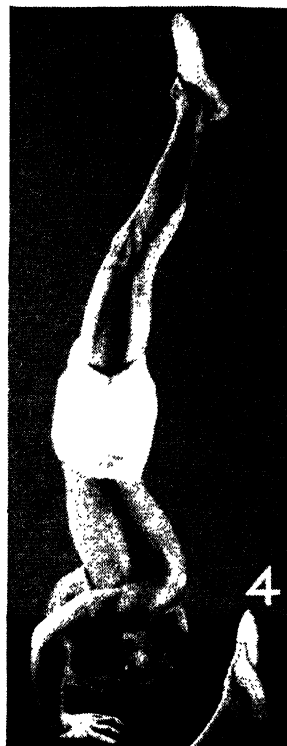
HORSE VAULTING EXERCISES. (See description next page.)

HORSE VAULTING EXERCISES

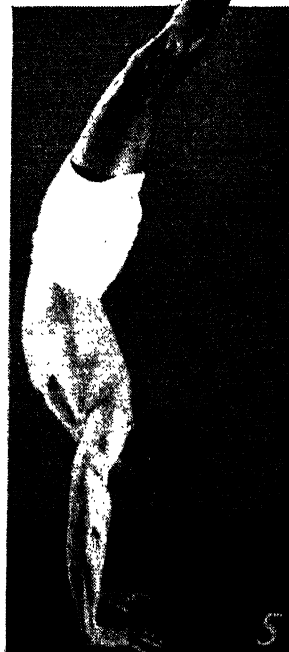
1. *Straddle Vault.* Stand facing the horse and take a firm grip on the handles. Spring upward and forward, spreading legs as illustrated. When feet are clear over the horse, loose hold, so that the body may pass. Alight in front of horse.
2. *Wolf Vault.* Stand facing the horse and take a firm grip on the handles. Spring upward and forward, swinging the right leg outward over the horse and drawing up the left knee so that the leg will pass between the hands. As the outstretched leg swings forward, loose the hold on that side momentarily while the leg passes under. Both hands release hold a moment before alighting in front of horse. Alternate by stretching out the left leg.
3. *Rear Vault.* Stand facing the horse and take a firm grip on the handles. Spring upward and forward, swinging both legs to one side. As the legs pass over, loose hold on that side a moment before letting go on the other side. Alight in front of the horse. Alternate by swinging legs to the other side.
4. *General Vaulting.* This picture illustrates an excellent starting position for a great variety of twists and vaults over the horse. The hold may be taken on the near handle or the far handle to suit the particular move; or both handles may be grasped. (See illustration of this movement on next page.)
5. *Scissors Vault.* Straddle horse as in Exercise 4, with hands on near handle. Put weight on arms, leaning forward. With a quick lift of the body and snap of the legs, raise the legs clear of the horse and cross them with a scissors movement, passing right leg backward and over the left, bringing the latter forward and under. Return to first position and reverse the movement. After becoming more expert the movement may be reversed without returning to first position. (This movement is illustrated on next page.)
6. *Right Arm Stride.* From position as in Exercise 4, except sitting on the other end of the horse, grasp the near handle with the left hand and the far handle with the right. Lean forward, resting the weight mostly on the left arm. Raise legs, backward, bringing them together and swinging them to the right and forward over the far end of the horse. When well over, loose the right hold, separate the legs, and allow the left leg to pass quickly under. Resume hold between the legs and end at position shown. (See next page for illustration.)



HORSE VAULTING EXERCISES. (See description preceding page.)
1146



TUMBLING. An excellent means of developing agility, flexibility, speed and muscular control, coordination and balance. (For description of illustrations see next page.)



TUMBLING EXERCISES. (For description see following page.)

(Photographs 1 to 5 appear on preceding page)

1. (a) *Forward Draw.* Bend forward and place hands and head on the mat, keeping hips up and legs extended with knees rigid; now draw the body forward, as far as possible by bending the neck and shifting the hips forward. The movement can be carried even farther than shown in the illustration.
(b) *Forward Roll.* From position illustrated, roll completely over, flexing knees and thighs so as to be able to stand up when the feet reach the floor.
(c) *Backward Roll.* This is the reverse of the preceding movement. Instead of standing up after the forward roll, return to first position by rolling backward. The hands are again used as a lever to support the neck as the legs come over.
(d) *The Dive.* Having mastered the preceding movements thoroughly, the dive may be practiced standing or after a short run. The hands reach the floor first to break the fall, the head being bent well under, so that the weight will land on the neck and shoulders, from which position the forward roll up onto the feet is performed.
2. *Neck Snap.* Recline on head and shoulders with legs extended overhead and hands placed against the rigid knees, as in the illustration. Roll forward slightly so the legs are less directly over the face, then, assisting with the hands, snap legs vigorously forward, flexing the knees so that the feet may be doubled under the hips. Assist the snap also with the neck so as to lift the body and bring one up onto the feet. This move may first be tried with the hands in position as shown in 1. It enables one to push off with the hands and makes the snap easier. The snap is more easily done by beginners if the neck and shoulders rest on a rolled mat.
3. *Head Snap.* The body is placed in the position illustrated. Leaning the hips forward until the balance is about lost, with a quick, vigorous snap the legs are thrown up and forward, as in the Neck Snap, arching the back well as the legs come over the head so that one will land on the feet. This should first be tried starting from position shown in 1 and 4.
4. *Head and Hand Stand.* Assume position shown in 1, except that the weight is on the top of the head rather than toward the back as shown. Draw the body forward, keeping the neck straight, and raise the legs to perpendicular position, as in 4. Keep legs straight and point the toes. From this position the head snap may be performed or one can push up to hand stand. This is a good preparatory exercise for the hand stand.
5. *Hand Stand.* This should first be practiced within a foot or two of a wall so that one can steady oneself with a foot against it if necessary to prevent going completely over. Having acquired the balance, walking on the hands forward and backward should be practiced. Try also to press up to a hand stand from the head and hand stand position.



In practicing tumbling, a partner may often be used to assist. All movements should be performed on well padded mats until one becomes expert.



TUMBLING EXERCISES. (For description see following page.)

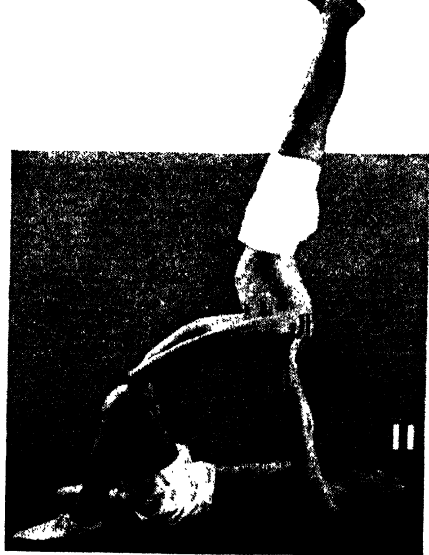
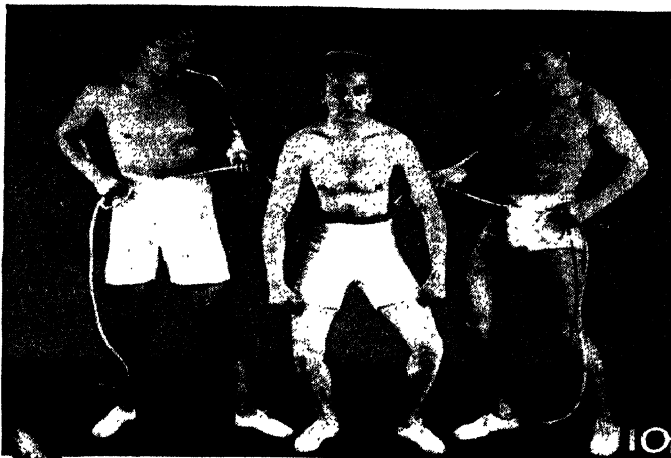
TUMBLING (*Continued*)

(*Photographs 6 to 9 appear on preceding page*)

6. *Forward Handspring.* Following a short run, one bends quickly forward, places both hands on the floor and throws the legs vigorously up and forward, arching the back well as the legs come over in order to land on the feet. A vigorous forward flexing of the body plus the momentum and a push with the hands will lift the body sufficiently to enable one to come up to standing position. The spring must be performed with snap and vigor. After mastery with the run the handspring may be made from the stationary position.
7. *Forward Handspring with Assistance of a Partner.* Sit astride your partner's neck and place your hands firmly on his hips. When ready, he vigorously lifts upward to give you momentum, and you turn the handspring from his hips in the manner above described. In this case, the partner's lift takes the place of the run and assists in getting the body up and over.
8. *Back Somersault with Assistance.* Stretch left leg forward and place left hand on partner's shoulder, who places his left hand under your extended calf and his right hand below the center of your back. At a prearranged signal jump vigorously upward with the right leg, arching the body backward, and throwing the legs completely over so as to turn a somersault and land on the feet, the partner helping you into the air by a strong lift on your extended left leg and helping to turn you over by a lift and twist with the hand which is on your back.
9. *Back Somersault.* A variation of the preceding. Take positions as illustrated. Partner keeps his feet well apart and braced ready to lift. At the prearranged signal jump vigorously upward with the left leg, flinging the body back and over into the full somersault, the partner assisting by a strong upward lift and fling of your right leg.
10. *Forward or Backward Somersault with Assistance of Safety Belt.* The easiest method of learning for a beginner, as it gives one confidence and assistance. The performer with safety belt secure and held by an assistant on each side, jumps vigorously upward and backward, arching the back so as to turn completely over and land on the feet. The partners assist with a good lift on the ropes. In going over, the knees must be bent and the thighs flexed on the abdomen. One excellent rule to follow is to grasp the legs just below the knees immediately after the upward, backward movement has been made, and relaxing the hold almost instantly in order that the limbs may be straightened for the landing. If this rule of bending and drawing in the limbs is adhered to, the problem of somersaulting is practically solved after short practice. The forward somersault is done in the same way except that the body is bent forward. Swimmers can best practice somersaulting from a board or other support a little above the water. (See next page.)

TUMBLING EXERCISES

Beginners in tumbling may require the assistance of special apparatus, as well as of partners. In all cases, balancing exercises are important in order to develop the needed bodily control.



11. *Head and Shoulder Balance.* The partner lies on the mat with knees drawn up. The knees are held about the width as the shoulders apart. The performer places his hands on the partner's knees and, kicking off with his feet, leans forward till his shoulders rest on his partner's outstretched palms. Then the legs are raised to the position illustrated, after which the dismount is made by a forward or backward spring.
12. *Two High Mount.* Partner stands with feet apart, legs braced. With hands of performer and partner interlocked, right in right, and left in left, the performer places his right foot on the other's thigh; then with partner helping through the left hand hold the performer springs, placing his left foot on the other's left shoulder, and following with the right foot to the right shoulder, releasing the hand hold. For support and balance, the partner grasps the calves. With hands grasped again, the performer may do a forward handspring from partner's shoulders, or dismount by forward or backward jump.

Apparatus and instruction of the sort obtainable in the gymnasium are not within the reach of all health-seekers, to be sure. In many cases, fine physical development has been attained by those who have never enjoyed such advantages. You will find many interesting and instructive details on the building of a symmetrical, strong physique in the course of the further pages of this section.

For the most part, you will find the exercises here described may be classed as free-hand movements, and may be classified as resistance or tensing exercises. They do not require apparatus, unless a chair or some other article of furniture might be called such. Their persistent use will produce a symmetrical, beautiful body, with strength above the average. Special attention is given to those parts of the body which are particularly deficient, and if specific corrective exercises are needed they should also be employed.

Following this discussion the heavier developmental exercises will be considered. The various parts of the body and methods of developing them are taken up in alphabetical order in succeeding pages.

Neglected
Organs

ABDOMEN.—If there is one part of the body that is more neglected than another in the matter of exercise it is the abdomen. There is practically no form of manual labor which will give the muscles of this part all the exercise they need. Stevedores and furniture-movers, for instance, may look like powerful men, but their abdomens are not developed in proportion to the rest of their bodies unless they take special exercise. Their work requires them to use the arms, back, legs and to some extent even the neck, but the abdomen is used only as a fulcrum for the action of the other muscles. Of course, this brings about some development, but not as much as is produced in the other parts of the body.

The actual significance of strong abdominal muscles is not confined to physical exertions. A strong abdominal wall indicates that the organs of the abdomen are marked by a similar healthy tone and are capable of performing the work allotted to them efficiently and completely. This is not possible when a flaccid abdominal wall encloses organs even more flaccid.

Many persons are interested in developing their arms, neck, and chest, and are inclined to forget about the back and

upon this alone the abdomen will not be as strong or as beautiful as it might be. Moreover, the back muscles and the deep-lying muscles between the legs and spine must be given attention in order to develop the abdomen properly. In fact, no part of the body can be at its best unless other parts are kept in good condition. A number of abdominal exercises that will be found very helpful in building up this important part are illustrated. The exercises described and illustrated in the sections on the back and hips will also be of value. When able to perform the movements easily while lying in a horizontal position, the body-raising movements may be made more strenuous by taking them on a board arranged to slant so that the head will be lower than the feet.

There are not many sports and games which are of particular value for the abdominal muscles, which is another reason why special exercises should be taken for this part. Swimming, wrestling and rowing are about the only ones that have any noticeable effect, though jumping might be included. Boxers have well-developed abdominal muscles, but they get them from special exercises and not from boxing. Of course, all sports and games use the abdominal muscles to some extent, but not strenuously enough, as a rule, to have a really developmental effect. Various exercises on the gymnasium apparatus, however, are very helpful in developing the abdomen.

Helpful
Exercises
for the
Abdomen

On account of the possibility of rupture, it is especially necessary, in taking abdominal exercises, to avoid strain. But when the general rules for taking exercise are followed there will be no danger of this, and one should not get an exaggerated idea of the danger of rupture. Before attempting any of the movements described in this section it is presumed that the student has prepared himself by using light exercises until they have become easy. It will be noticed that all the abdominal exercises are taken lying down, which is a further protection against the possibility of rupture. One should watch the breathing and exhale when making powerful contractions of the abdominal muscles, inhaling when the muscles are relaxed or making lighter contractions. The chief abdominal exercises are body-raising movements, but the legs should not be neglected.

In body-raising the position of the arms has much to do

with the severity of the movement. The easiest way to raise the body is to start with the arms extended overhead and then swing them forward as the body comes up. The next easiest is to place the hands on the abdomen or on the hips. When a little stronger the arms may be folded across the chest, and later the hands can be clasped behind the head. The lifting of the body is most difficult when the arms are crossed behind the head, or extended above the head and kept in that position as the body is raised. It is always well to start with the easiest method, proceeding to others as the strength is determined or increased. The lifting of the body should not be done with too much of a jerk, but should be as smooth and regular as possible. Some may have to hold the feet down at first in order to get this smooth action. This can be done by placing the feet under some heavy article of furniture. As soon as possible this assistance should be discarded so that the exercise will be more truly developmental. Inability to raise the body without such assistance, however, may not be due to lack of strength but to lack of balance and muscular control. Anyone who has taken constitutional exercises should be strong enough to raise the body without having the feet held down, except in the side-lying position. In all movements calling for a twist of the body the turn should be carried as far as possible in order to powerfully contract the side-abdominal muscles, as there is some tendency to neglect these. Straining should be particularly avoided if one has an excess of fat on the abdomen or the body in general.

**Weak Back
Muscles**

ARMS.—Constitutional exercises do not call for any very strenuous use of the arms, except in the case of some of the floor calisthenics. Most of the arm movements use the shoulder muscles, and the movements for the forearm are so light that little bulk or strength is developed. The developmental exercises are therefore especially important for the arms. All parts of the arms must be well developed, both for strength and symmetry; but while all small and many grown-up boys are fond of showing what a large biceps they have, they will often neglect the other arm muscles. A strong biceps is of little value without a strong forearm, and unless the triceps is also developed the arm will look out of proportion. Furthermore, it is the muscles in the forearm which

that stands out immediately is that the back includes the spine and the spine houses the spinal cord from which nerves pass out to all parts of the body. It has already been explained in the section on anatomy that the small bones of the spine are held together by cartilage, ligaments and muscles. If these are not properly and evenly developed the vertebrae will not be held in position, and if they slip even a little distance there is pressure upon the spinal nerves and blood-vessels which interferes with their action and hence with the action of the organs and glands activated and supplied by them. Weakness of the back muscles from lack of exercise is always one cause of spinal curvature. Even if the bones do not actually get out of position weakness of the muscles and ligaments will permit some of the latter to stretch, according to which happens to be subjected to the most strain, and this in turn leads to a contraction of opposing ligaments and muscles, which interferes with both circulation and nerve-action. Lack of exercise of the back muscles also deprives the spine of its normal blood supply, for without exercise there cannot be normal circulation. Thus it will be seen that any weakness of the back will reduce the efficiency of the spine, and this affects the entire body.

Exercises for
the Back

It is hardly necessary to point out the importance of the spine. It is truly the "back-bone" of the individual and unless it is in good condition no part of the body can be normal. All parts depend upon nerve-action, and anything which interferes with this action interferes with health. In the central nervous system the spinal cord and the nerves coming from it are next in importance to the brain, and for certain parts of the body they are even more important. Even the back muscles themselves cannot act normally unless they are supplied with energy by these nerves. Since lack of exercise permits conditions to develop which interfere with this nerve-action, the muscles deteriorate both from lack of use and lack of nerve-supply. Once such a condition has developed it may be necessary to employ other measures, such as spinal manipulation, as well as exercise, to correct it. But proper exercise will prevent all these troubles, if the other habits of living are right.

A strong back is important for other reasons than those

already named. Proper posture is impossible without it, and if the body is allowed to slump forward there is pressure upon the heart, lungs and digestive organs, and interference with their functions. Under these circumstances perfect health is impossible. Strength of the back is necessary, too, for many movements of the arms and legs. In doing any sort of lifting the back must be "set" before the arms and legs can do their best work; or if the lift requires movement of the back, the muscles must be strong enough to do the lift and at the same time act as a base for the arm and leg movements. We may not often be called upon to lift things, but it is always well to be prepared for emergencies.

Well-developed back muscles are not only of practical use in daily life, but they serve as a protection and improve one's appearance. A blow on the lower back is quite likely to affect the kidneys, unless there is a thick cushion of muscle to absorb it. Accidents putting a sudden strain on the back may dislocate it, or actually break it, if it is not supported by powerful muscles and tough ligaments. A fall on the back will also be much more injurious if there is no cushion of muscle. As for appearance, everybody admires a broad strong back, even in the case of a woman. It insures a good posture and makes one look well in almost any kind of clothing. A woman may be of normal weight, but if her back is covered with fat instead of muscle she will never have the clean, well-modeled, graceful lines of the muscular woman and will not appear to advantage in evening dress. The muscular woman always has enough fat to smooth down the rugged outlines, so no woman need fear having too much muscle. As for the man, a well-developed back gives that broad-shouldered, trim-waisted effect so much desired, and is always suggestive of self-reliance and efficiency.

The movements for the back which are illustrated should be done rather slowly and should be carried to the fullest possible extent, in order to cause a powerful contraction of the muscles. Lifting the body with a jerk and then letting it drop back will not require the same amount of exertion and will therefore not give the same amount of development as a slow even lift, holding the body up for an instant at the "top" of the movement. When doing movements lying face down, the position

of the arms will determine the amount of exertion, just as it does when raising the body from the reclining face-up position. The easiest position is with hands clasped behind the back, and they may be held either in this position or stretched downward as the body rises. The next easiest position is with hands clasped behind the head and the most difficult is with arms extended overhead. When using the latter position and lifting the body alone without the legs, it may be necessary to place something over the feet to hold them down, in order to get the slow even pull upward instead of the jerk. It is well to practice lifting the body alone and the legs alone, as well as both together, as the movements have a slightly different effect on the muscles and involve different muscles.

A narrow table with a strap around one end is very convenient for these exercises, as it can be encircled by the arms for leg movements, while the strap secures the feet for body-raising movements. Of course, this is non-essential as far as results are concerned. The leg movements referred to here will be found illustrated in the section on the hips. These exercises affect the muscles of the lower back as well as those of the hips. Various neck exercises are also valuable for the back muscles, and the shoulder movements, too, can be employed. Variations of all the movements can easily be devised after one has become accustomed to those illustrated. As one exercises one becomes acquainted with the muscles, and through slight changes in position and combinations of movements can produce an almost infinite variety of exercises. As has already been pointed out, variation of the exercises not only maintains interest but produces a more balanced and perfect development.

**Exercise
and the
Back-Bone**

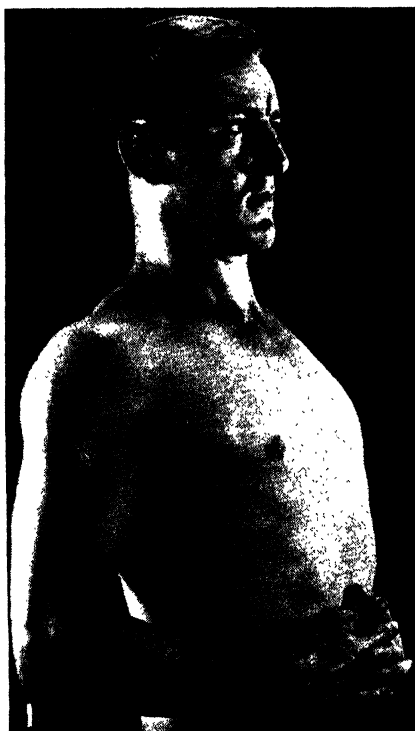
Almost all games and sports use the back muscles to some extent. Those requiring considerable bending and twisting of the body are especially valuable, such as baseball, basketball, football, handball, and tennis. Individual sports, such as boxing, canoeing, fencing, rowing, swimming and wrestling—especially wrestling, are very good. You never see a wrestler without a well-developed back. This is because so much attention is given to the exercise of “bridging” and also because most of the holds require the use of the back muscles. However, even if one is interested in many sports and gives

them considerable time, it is still advisable to take a few special exercises for the purpose of developing flexibility and strength of the back.

CALVES.—See *Legs*.

The Chest

CHEST.—The chest is a rather indeterminate part of the body when we come to consider how to develop it. Anatomically it consists of that part of the body between the neck and abdomen and more particularly the front part, for the only muscles designated as the chest muscles are those over the front of the upper ribs. When a man says he has a cold in his chest he means he has an inflammation of the bronchial tubes, but when he speaks of a well-developed chest, whether



CHEST EXPANSION AND DEVELOPMENT EXERCISES

1. Clasp the hands over the upper part of the abdomen. Inhale slowly and deliberately through the nostrils till the lungs are fully expanded, at the same time drawing the shoulders back as far as possible. Exhale slowly, relaxing the shoulders gradually. Repeat several times.
2. After inhaling a full breath, exhale completely while drawing the shoulders forward as far as possible. Repeat several times. Then combine the two movements here described.

he realizes it or not, he includes all the muscles of the thorax, even in the back, together with those of the shoulders, and he assumes that the cavity contains well-developed lungs. In order to obtain a perfect chest attention must be given to all these parts; but since the lungs and back have already been covered, this section will be confined to the chest and intercostal muscles.

Of course, the size and general formation of the bony framework of the chest is determined largely by heredity and early environment, and whatever change may be made thereafter will be dependent chiefly upon deep breathing, but some of the exercises described here will help to lift the ribs and by increasing the size of the muscles will give the chest a larger and better appearance. It is presumed that breathing exercises will be combined with the muscular exercises, as has already been advised, and that due attention will also be given to shoulder and back exercises. A good back development will increase the chest measurement considerably, even though its actual capacity and that of the lungs remains the same.

The Well
Developed
Chest

The exercises illustrated, in common with all other developmental exercises, should be done rather slowly, with care to carry each movement to the fullest extent. Tensing and resistance have much to do with making these exercises developmental in character. Varying the position of the arms in the exercise of crossing the arms will influence different fibers of the pectoralis muscles. When the arms are crossed overhead the upper fibers are used, when crossed at shoulder height the middle fibers are employed, and when crossed as in the illustration the lower fibers are most active. All three positions should be used so as to produce a rounded development. The other exercises can also be varied somewhat by changing the position of the arms. Another valuable exercise for the chest muscles is the "push-up" described as an exercise for the triceps in the section on *Arms*. When it is also desired to affect the pectoralis muscles the shoulders should be drawn forward after the arm is straightened; that is, the body is pushed up to the very highest possible point. All deep-breathing exercises are of value, since they develop the intercostal muscles, and all twisting movements of the body are helpful because they affect the serratus magnus muscle which

covers the sides of the chest. Study the anatomy of the chest and entire thorax and you will soon discover which muscles need attention and which exercises are of value in addition to those for the pectoralis major and minor.

Uses of Chest
Muscles

Practically all sports and games are of value for the chest muscles as for the back, especially those calling for the clasping of the arms to the body or for forward-throwing movements. Whenever one throws a ball one uses the chest muscles; hence all ball games are of value, including bowling. Individual sports such as boxing, bag-punching, fencing, rowing, swimming, weight-throwing and wrestling are all especially helpful. Boxing and wrestling probably hold the premier positions. Boxing calls for many vigorous forward-striking movements and for gripping with the arms in the clinches. Anyone who has ever seen a wrestling match knows that all that "hugging" could never be done without powerful chest muscles. In fact, wrestling as an all-round developer is hard to beat, and it is to be regretted that wrestling is not more popular among amateurs. In training for either boxing or wrestling special attention is given to bag-punching and the use of chest-weights, but all forms of gymnasium apparatus are valuable for developing the chest muscles, because they all use the arms, and the arms cannot make many movements without employing the chest muscles. As many of the ordinary movements of everyday life use the arms, and hence the chest muscles, these muscles are generally developed to some extent, even in individuals who do not take special exercise. However, this should not lead one to believe that special exercises for the chest are unnecessary. Since we have invented so many machines to do our manual labor a really normal development can only be obtained in this way.

A truly well-developed chest is one that is not only developed muscularly but which is broad and deep. The value of such a chest is self-evident, for the chest houses the heart and lungs and these important organs cannot be at their best unless they have room to work. A strong heart and a good pair of lungs mean vitality and endurance and are well worth cultivating. Exercises for the chest muscles will help to do this, because any exercise calls for increased heart and lung action, as has already been explained. There are no special

exercises for the heart. It is developed by *any* exercise. Even deep breathing exercises the heart. Of course, if the heart is actually diseased it will be necessary to use especially graduated exercise. Walking is generally used for this purpose, but the fact that other exercises can also be employed shows that all exercises affect the heart. Possibly exercises for the chest and upper-back muscles might have a little extra effect on the heart, because of their influence on the spinal nerves, which govern the heart to some extent, but in any case a well-developed chest is necessary if the heart is to be properly developed. The lungs are also influenced by any exercise, but are especially affected, of course, by deep breathing. This is always a part of chest development. The other chest exercises, especially those calling for lifting of the ribs, will also favor lung development. So while exercises for the heart and lungs are of value in developing the chest, exercises for developing the chest are of value for the heart and lungs, which is one of the most important reasons for taking such exercises.

Another important reason is that a well-developed chest adds so much to one's appearance. Appearances may often be deceiving and brains may be more necessary than muscle, but the fact remains that everybody admires the person with a well-developed chest. A man with a small chest and a big abdomen is the butt of jokes, but the man with a big chest and a small abdomen is an object of respect. Even if he grows careless and allows his abdomen to increase considerably in size, the big chest above it will continue to command respect. A man or a woman with a good chest looks better in common clothes than an individual with a caved-in chest looks in the finest creations of the custom tailors or the Paris fashion arbiters. Personality may overcome the handicap of a frail body, but the man or woman with the big chest and the vitality that goes with it has a tremendous advantage over those who lack these assets. So let those who do not have good chests use every effort to develop them and let them start early, for one can always bring about greater changes in the bony framework of the thorax before maturity.

The Chest
and
Appearance

FOREARMS.—See *Arms*.

HIPS.—The hips seem to be of interest chiefly to women and mostly because they need reduction. For this purpose



EXERCISE FOR DEVELOPING THE HIPS

1. Lie face downward on the floor, upper body supported on the elbows as in the illustration. Raise the left leg as high as possible—*one!* Return it to the floor—*two!* Perform the same movement with the other leg—*three* and *four!*

developmental exercises may be used, because, as previously noted, such exercises replace fat with muscle. Regardless of whether they require reducing or building up, however, they need, for several reasons, to be strong.

The hip region, like the chest region, is rather indefinite. However, it is usually understood to include the structures around what are technically known as the innominate bones. These form the walls of the pelvis and act as the connecting link between the spine and the legs. They are connected to the upper body only at the lower end of the spine and hence depend for their support quite largely on muscles and ligaments, among which are the hip muscles. If these are not properly developed, strains can easily cause a slight dislocation of the bones, with resulting interference with nerve-action and circulation through pressure on the nerves and blood-vessels. We hear much these days about sacro-iliac sprains causing sciatica and other disturbances. This sprain is a result of weakness of the hip and lower-back muscles which allows the upper part of the hip-bone (the ilium) to twist slightly at its joint with the sacrum. The orthopedic surgeons prescribe a special brace for these cases, which of course conduces to a further weakening of the muscles, because it makes it unnecessary for them to work. The only way really to correct the trouble is through rest for a time, manipulative treatment and then developmental exercise; but if the latter were taken as regularly as it should be sacro-iliac sprains would be rare.

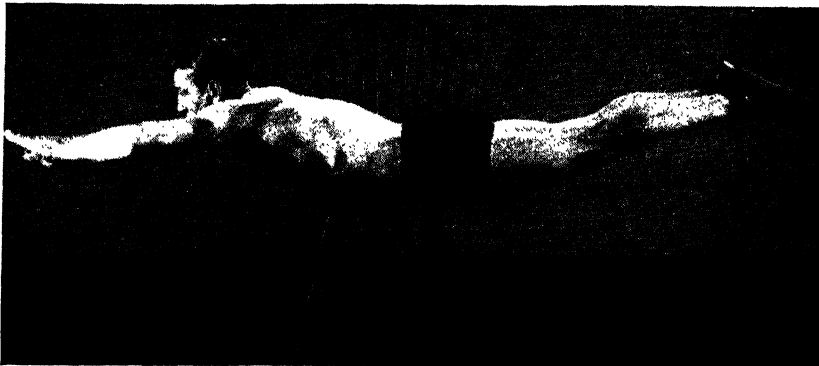
Sacro-iliac
Sprains

There is another part included in the hip region which, while it is small, is very important. This is the part between the legs, commonly called the crotch and technically known as the perineum. This is composed of muscle and ligaments forming the floor of the pelvis and hence acting as a support for the pelvic organs. This region is especially important to women, because if these muscles are not well developed the uterus will not be properly supported and prolapsus is quite likely to occur. However, lack of support for the pelvis means also lack of support for the abdominal contents, and this will affect either sex.

The Crotch

The sides of the hips should be strong so as properly to support the legs and hold them in position. Many leg movements depend upon the action of the hip muscles, and if these are paralyzed the legs become of little use. We do not realize how important the hip muscles are until we see someone who has lost the use of them, or have lost the use of our own. From the muscular standpoint the hips include the gluteal muscles (buttocks) which extend, rotate and abduct the thigh; the adductor muscles which draw the thighs together; the muscles of the perineum; and various deeper muscles which are attached to the hip-bones or near-by, such as the obturators, iliacus and psoas. Movements which affect the superficial muscles will also affect the deeper ones. These muscles are exercised chiefly by leg movements, and so the exercises for

Hip Muscles



EXERCISE FOR DEVELOPING THE HIP

2. Lie across a stool or a chair as illustrated, weight resting on the abdomen, and repeat the preceding exercise. The hands and feet may touch the floor, or swing down towards it as the first position. Repeat 5 to 10 times.

the thighs given under "*Legs*" will be of value in addition to those here illustrated. Exercises for the lower back and abdomen are also helpful and supplementary to hip exercises. In fact, almost any movements calling for the use of the body or legs, or the two in combination, will be of value for developing the hips.

For this reason all active sports and games are very helpful. Running, jumping, hurdling, rope-skipping, weight-throwing, swimming, boxing, wrestling and all ball games can be employed to advantage. Some of these are more in the nature of constitutional than developmental exercise, but they are all useful for the latter purpose. Gymnasium apparatus work is helpful to some extent, but does not affect the hips quite as much as it does the upper body.

The exercises illustrated should be performed rather slowly, with a strong pull on the muscles at the end of the movement. Variations can easily be devised, and suggestions may be obtained from the movements illustrated for other parts of the body. The exercises here given will affect all the hip muscles, but a few variations will add interest, and thereby produce better results.

Exercises for
Perineum

An exercise that is very valuable for the perineum consists of drawing in and up on the muscles in this region as though suppressing a bowel movement. Do not pull merely on the rectal sphincter, however, but be conscious of a contraction along the entire length of the perineum from the anus to the front of the body. This may require a little practice, as most people are not very well acquainted with the muscles in this region. They will have to send messages to the part until they establish connections, and then through practice gain more perfect control. One should not overdo this exercise at the start, as it may overstimulate the nerves or have a tendency to interfere with intestinal peristalsis. However, if one starts with only three light repetitions and gradually increases to ten fairly vigorous ones, there will be no trouble. There should be a pause between each repetition in order to permit complete relaxation. If one indulges in many active games and sports it will not be especially necessary to use this exercise, but occasional practice of it will still be indicated.

From the standpoint of good looks the hips are more

important than at first appears, and anyone who is interested in his appearance will do well to give some attention to the developmental exercises for these parts. Many men have exercised the upper part of their bodies until they have secured a fairly good development, while their hips and thighs remain so slender as to appear out of proportion. Under-developed hips may even be seen with well-developed calves. Most women probably need to reduce the hips, as their sedentary occupations, general lack of activity and tendency to put on weight cause fat to accumulate in the region, but not a few women who are underweight would do well to exercise to develop them.

Small
Hips

Fat hips are not beautiful, but thin ones are even less so, for they are practically always associated with thin thighs. Regardless of what fashion decrees a woman is not a woman without well-rounded hips and thighs. The same exercises will either reduce or develop the hips as needed, if the diet is properly regulated. So if one desires to be all man or all woman, fully developed, symmetrical and efficient, one will not neglect the hips, even though they may seem unimportant because they occupy a small space and are not clearly differentiated from adjacent parts of the body.



EXERCISE FOR DEVELOPING THE HIPS

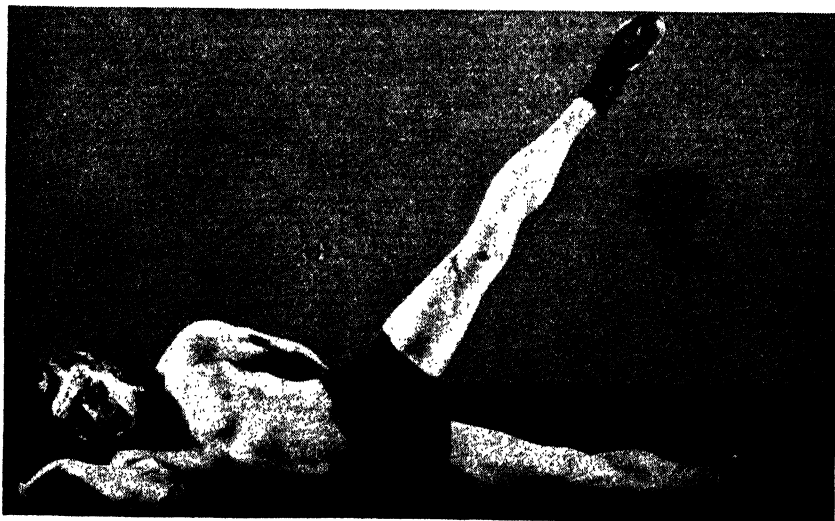
Lie face downward across a chair as illustrated, grasping its legs to maintain balance. Raise both legs together as high as possible—*one!* Lower to first position—*two!* Repeat this movement 5 to 10 times.

Parts of
the Leg

LEGS.—The legs, as commonly understood, includes all that region from the hips down, including the feet. Technically, only the part between the knee and the ankle is designated as the leg. The upper part of the limb is known as the thigh. From the standpoint of development we need to consider the large group of muscles on the front of the thigh, the somewhat similar group on the back, those on the inner side, the muscles on the front of the leg, the calves, and the muscles in the feet. Unless all these are properly developed the leg will neither be as strong as it might nor as symmetrical and good-looking. The popularity of sports in which clothing is reduced to a minimum, and the use of short skirts by women and of knickers by men for ordinary wear, brings the legs into public view, in many cases far too much so for the owner's peace of mind. A person otherwise well-favored as regards appearance may be spoiled by undeveloped or fat legs, as well as by actual leg deformities. When the leg bones are deformed it may be difficult to improve them to any great extent, but proper development of the muscles will make the deformity less apparent.

Strengthen-
ing the Leg

In improving the appearance of these members you will also improve their strength, and this is important. Modern



EXERCISE FOR DEVELOPING THE HIPS

Lie on the floor on the right side as illustrated. Raise the left leg as high as possible, keeping the knee rigid—*one!* Lower to first position—*two!* Repeat the exercise 10 to 20 times before turning over on the left side to perform the same exercise with the other leg.

scheme by which the student can devise others which will develop every part of the body, powerfully if he chooses, but at any rate symmetrically and perfectly. Everyone should have a working knowledge of muscular anatomy, and with this knowledge a system of exercises adapted to individual needs can be easily invented or arranged. The application of the principle of resistance is especially valuable in strengthening the fingers, the wrists, the neck and any parts not well provided for in the ordinary systems of all-round exercise.

TENSING EXERCISES consist of the voluntary contraction, or "tensing," of the muscles of the body, without the use of apparatus or any form of external resistance, opposing muscles being used to counteract or resist each other. They are sometimes called antagonistic exercises, and sometimes by other names.

It is possible to execute tensing exercises with a certain amount of movement, but usually they are performed without motion, especially when equal force is exerted in the opposing muscles. In the case of the arm, for instance, the flexor muscles will be contracted in resistance to the extensor muscles, the result being a rigidity and hardening of the entire upper-arm.

Tensing has various advantages as a form of exercise, but also has certain drawbacks. One of the former is the convenience of taking the exercise at any time, without removing the clothing, and even without being noticed when executing them in public. At odd moments through the day, for instance when waiting for a train, while riding in a train or trolley, or even when walking along the street, one can voluntarily tense or harden the muscles of different parts of the body, thereby accelerating the circulation and building strength. Those who think that they have no time for exercise may at least avail themselves of this method. The tensing of the muscles requires concentration, however. For this reason, while it can be done at odd moments and with the clothes on, better results are secured when the body is unclothed, as the muscles can then be observed in action and better concentration thereby obtained.

**Tensing: Its
Advantages**

Tensing may be made mild or vigorous as desired and thus adapted to the needs of different individuals, but for those who

are not yet very strong it is better to use free-hand calisthenics and other constitutional exercises, as they require less expenditure of nervous energy and permit a better circulation. The tensing principle is better adapted to the needs of those who already have some measure of strength and development. For these it has the advantage of being a time-saver, not only because the exercises can be taken at odd moments, but also because more exercise can be condensed into a given period of time. The powerful contractions are equivalent, as far as exertion is concerned, to the lifting of heavy weights, so that it does not take long to produce fatigue. There is no doubt that by the practice of tensing one can harden the body and make it very rugged and vigorous, even though the most perfect results may not be attained.

Tensing also helps to give one voluntary control over the muscles, for one learns to harden or tense one part or another as the mind may direct. Athletes and theatrical strong men who do poses in public thus acquire such a degree of control that they can often isolate muscles in a remarkable manner. The vigorous contraction of the muscles for the purpose of making them stand out conspicuously when posing is really a strenuous exercise, and the practice of such poses before a mirror, causing the muscles of first one part and then another to be outlined as sharply as possible, may be commended as a part of one's general scheme of training for development.

The first and most important thing to be kept in mind in connection with the practice of tensing is the necessity for very frequent and complete relaxation. One should avoid the "tetanizing" tendencies of tensing the muscles too long at a time, as it wastes energy and interferes with circulation. Voluntary and complete relaxation, in frequent alternation with powerful tensing, is the proper procedure and will help to give that muscular control which has just been referred to.

However, the exclusive use of tensing as a means of exercise is not to be recommended. The lack of action is one objection, though this may be largely overcome by introducing motion into the exercise, or, in other words, contracting one muscle or set of muscles more vigorously than the opposing muscle or muscles and thus allowing the former to move slowly the member of the body concerned, against the less resistance of the

other muscles. This is not perfect tensing, however. Neither are the movements so produced likely to be as complete as they should be.

Probably the greatest objection to tensing lies in the fact that in the very nature of the exercise the complementary muscles must necessarily oppose each other. Instead of getting control of each muscle individually, and training it to act independently, the muscles are trained to work against each other in a somewhat unnatural manner, which tends to interfere with normal action.

An important purpose of muscle is to produce motion. The ideal exercise is one which allows the muscle to fulfill this purpose without interference, moving either the body or some part of it, or some external object, and without any restriction except the special resistance which it is intended to overcome in the course of the exercise. The purpose of the triceps, for instance, is not to interfere with the biceps, but merely to extend or straighten the arm. Under normal circumstances, when the triceps is called into action to extend the arm, the biceps is and should be utterly relaxed, and exercises which realize this condition are best. But after one has trained the muscles through a system of tensing only, muscular control is likely to have become so abnormal that when extending the arm the biceps also will contract, offering a large measure of resistance and tending toward mere rigidity of the entire arm. When using certain muscles in the everyday affairs of life, one is likely to find oneself hardening the complementary muscles and impeding one's own actions, simply because the muscles have been trained to act in this way. A certain amount of rigidity and hardness of the muscles seems to give one a sensation of strength and power, but this feeling is somewhat misleading. If carried very far, tensing exercises are inclined to make one slow, stiff and slightly muscle-bound.

Lack of
Motion in
Resistance
Exercises

Still another objection is the interference with the circulation involved in this simultaneous and rigid contraction of all the muscles of the part being used. If, as in normal movement, one set of muscles is completely relaxed while the opposing muscles are employed, the circulation is unrestricted through a great part of that member or section of the body. But in tensing this is not so, and there is more than twice the necessity

for frequent alternations of exercise and relaxation than in the ordinary effort.

Mental concentration in tensing exercises is such an essential feature that much is made of it by those who advocate them. But from the standpoint of the voluntary and individual control of the muscles, and also from the standpoint of strength-building, the apparent mental effort is misleading. For instead of all of the power of the mind and nervous system being concentrated upon one muscle or set of muscles, as should be the case for the development of strength, it is necessarily divided between the opposing muscles. Furthermore, in providing the resistance to one muscle by equally contracting another, one consumes just twice as much nerve-force as is necessary to accomplish a given result with either muscle. With those who are vital and strong, this may be no objection; but for those who have no nervous energy to waste it is an important matter.

Taxing the
Nervous
System

The claim is sometimes made that by this method the body can supply within itself a degree of resistance equal to that exerted by a heavy weight when lifted, but with less tax upon the nervous energy and less strain upon the heart. This, of course, is not and cannot be true, for in the case of a like resistance there would be twice the tax upon the heart and nervous system in the tensing exercise, since two muscles or sets of muscles are being used at once. However, the less said about "strain upon the heart" the better, for it is an ambiguous phrase commonly used only for the purpose of frightening people and deterring them from taking exercise. So long as one remains within the limits of pleasure and a rational moderation in exercise, there is no chance of trouble from a supposedly weak heart. In the majority of normal cases there is no danger, even when going to extremes in exercise, but of course such extremes are not to be commended.

Finally, summing up the advantages and disadvantages of tensing exercises, they may be recommended as a part of one's training regimen for variety, exhibition posing, as a means of getting exercise when time is limited, and as a means of warming up quickly before or after a cold bath or when chilly for any reason. It is not well, however, to limit oneself exclusively to tensing exercises.



PHOTOGRAPH UNDERWOOD & UNDERWOOD

PLATE 38. Group of members of a German-American Turnerbund, performing handstands outdoors on parallel bars.
Encyclopedia of Health; Volume III

As to their practice, it is unnecessary here to give complete specifications for all parts of the body. The exercises given will suggest others to the student. In these the back muscles oppose those of the abdomen and the region of the stomach, the sides antagonize each other and the upper-chest muscles those back of the shoulders, while various muscles of the neck work against each other and the same with the arms and legs. A few of the exercises are described so as to help make clear the method of executing them. All other muscles are tensed in the same manner. In reading over the list of exercises given it will be seen that as much movement as possible has been combined with the principle of tensing, thereby giving them the greatest possible value in actual practice. In other words, they may be called "flexing and tensing exercises." They are intended for individual or private practice, but may be employed in class work. The general starting position is always: Body erect, shoulders back, eyes straight to the front, chin in, arms hanging at sides. How to perform these exercises is described below:

Flexion and
Extension

Exercise 1. With the elbows pressed against the sides of the body, slowly flex the arms, tensing the muscles of the upper-arm vigorously, and tightly clenching the hands, thus compelling one set of muscles to resist the movement of another set.

Exercise 2. Clench hands tightly with arms flexed and hands as near to the shoulders as possible; then make several attempts to bring the hands still nearer to the shoulders without bending wrists.

Exercise 3. With arms stretched down at sides, hands clenched, make several attempts to bring arms still farther down.

Exercise 4. Turn the head slowly from far to the right to far to the left, flexing all the muscles of the neck and making one group of muscles resist the action of the other.

Exercise 5. Bring the head far forward and then far backward, tensing all the muscles, and making one set of muscles resist the action of the other.

Exercise 6. Bring the head over to the right until it very nearly touches the right shoulder, then slowly bring it over to the left shoulder, resisting with all the opposing muscles.

Exercise 7. With the shoulders held downward and backward, tense the arms vigorously, and then bring them slowly forward nearly on a level with the shoulders, then backward as far as possible.

Exercise 8. With shoulders held immovable backward and downward, bring arms outward to the side as high as you can.

Exercise 9. With muscles of back and chest tightly tensed, slowly bring the shoulders far forward, then far backward.

Exercise 10. Allow the shoulders to drop as far downward as possible, muscles tightly tensed; slowly bring the shoulders as high as you can.

Exercise 11. With the shoulders hanging as far downward as possible, make several attempts to bring them down still farther.

Suggested
Exercises for
Tensing

Exercise 12. With the arms held far forward, elbows rigid, slowly bring arms across the body in front, right arm under the left arm. Same exercise with the left arm under the right arm. Alternate these positions.

Exercise 13. Cross the arms as far as you can in front of the face, elbows rigid, then try to force them still farther across. Alternate with left arm under right and right under left.

Exercise 14. Slowly bend from far to the right to far to the left, tensing strongly the muscles of the waist and the back.

Exercise 15. Slowly bend from far forward to far backward, keeping the muscles of the waist strongly tensed.

Exercise 16. Slowly twist body from far to the right, with hips immovable, to far to the left. Same exercise twisting to the opposite side.

Exercise 17. Slowly raise the knee while keeping the thigh muscles tightly tensed. Pull the thigh in tightly against the abdomen. Relax and repeat.

Exercise 18. Slowly flex the leg on the thigh, keeping the thigh muscles strongly tensed. Alternate legs.

Exercise 19. Extend one leg forward, tensing all the muscles so as to make the leg rigid. Hold for a second, relax; and repeat with the other leg.

Exercise 20. Slowly raise the heels as high as possible, tensing all the muscles of the legs but especially those of the calf.

APPARATUS FOR EXERCISING.—There are various kinds of apparatus that may be employed to give a greater resistance to the muscles than can be obtained from the weight of the body. These include bar-bells, dumb-bells and elastic exercisers of many designs. Then there are other kinds of apparatus which, while they do not give any more resistance than could be obtained from the weight of the body, are more convenient to use and help to maintain interest. These include pulley-weights of various kinds and home substitutes for dumb-bells, such as flatirons, chairs, or other suitable objects. In the subjoined discussion of exercisers of mechanical design, chest-weights and pulley-weights of the sort used in most gymnasiums are briefly described.

**Exercising
and
Apparatus**

It is true that no matter what form of apparatus may be employed, the exercises are practically the same as those taken without apparatus. In using heavy dumb-bells and bar-bells, however, there is a special technique to be observed, so a section is devoted to weight-lifting. All the elastic and flexible exercises and pulley-weights are merely different methods of doing the same thing, so they are grouped in a section on elastic exercisers. The other items mentioned need no special attention, as the individual generally uses them in the way that appeals to him the most. It is well to avoid heavy apparatus until able to take free-hand exercises and use light apparatus with ease.

EXERCISERS OF MECHANICAL DESIGN.—There are several forms of mechanical devices for exercising which depend on the resistance they offer to pulling, lifting and other movements affecting the arms, chest and back. The more pretentious provide exercise for the feet and legs. The simpler forms of these exercisers consist of two hand-grips, with attachments for connecting the elastic resistance-elements. One to seven or more such elements may be used, the resistance increasing with the number. Some of the exercisers are arranged to be attached to the wall or floor, or both, while others have their own attachment. Steel springs are sometimes incorporated into small dumb-bells to be used for developing the grip. They

**Chest
Weights**

are also used in other special apparatus. But always the idea is the same, to offer a progressive degree of resistance beginning with one elastic cord or steel spring and proceeding gradually to larger numbers. A more stable form of exercise is that known as the chest-weight or pulley-weight. These are found chiefly in gymnasiums. They consist of two weights which slide up and down in parallel grooves, the weight being lifted by pulling on a cord which passes over a pulley. By attaching the pulley to the wall or the ceiling, different muscles can be reached. The weights are arranged in sections so they can be varied. By assuming different positions in relation to the exerciser all the muscles of the body may be employed. Most of these exercisers are attached to the wall and the following suggestions for exercises are based on this assumption.



Elastic
Exercisers

Chest Weight Exerciser. An arrangement of weights sliding in grooves and pulled by cords passing over pulleys. The weights are arranged in sections so that the resistance may be varied. This machine offers a constant resistance and is an excellent form of mechanical exerciser.

Stand facing the wall at a distance a little more than arm's-length, or at this distance plus the length of the exerciser. Be sure to keep the back erect. Starting from the position, arms forward shoulder-high and hand-grips of the machine held firmly, spread the arms out to the side as far as possible. From same starting position raise arms overhead, keeping the elbows straight, then bring the arms downward and backward as far as possible. Bend forward and touch the knuckles to the toes. Clasp hands, holding the grips of the machine, behind the head, then draw the head backward. Do the same bending the body backward.

Stand with the back toward the machine at about arm's-length from the wall. Flex arms so that the hands, holding the grips of the machine, are in front of the shoulders. Then strike forward with the arms alternately and together. Holding the hands at the shoulder points, bend the body forward. Holding the hands on the forehead, bend the head forward. Starting with arms hanging at the sides, raise them forward to shoulder height. Starting with arms extended to the side, shoulder-high, bring them forward until the hands touch.

Stand with the left side toward the machine at about arm's-length from it. Place one or both grips in the left hand. Starting with the hand in front of the left shoulder, extend it straight across the chest. Holding the left hand over the breast-bone (sternum) bend the body to the right. Place one or both grips in the right hand, then starting with the right arm extended to the left across the chest, elbow straight, bring the arm down and out to the right side as far as possible. Repeat all these exercises while standing with the right side toward the machine.

For the legs it is necessary to lie on the back in front of the machine and pass the feet through the grips, performing flexion and extension movements. If the machine can be attached close to the floor, however, one can do similar exercises in the standing position and can take the full knee-bend while holding the grips in the hands at the shoulder points.

The machines which are not devised for attachment to the wall are used by holding one grip in each hand and spreading the arms in various directions and positions, or by placing one grip in one hand and the other under one foot, performing flexion and extension movements with both arms and legs.

These elastic exercisers are valuable because they permit the use of progressive resistance, they add interest to the exercise, they do not take up much room and are comparatively light and easy to move around. Most people who use them like them. There is only one objection to their use and this is the varying resistance which they offer. As the elastic element is stretched the resistance varies, being less at the start of the movement than at the end; also, as the machine is used, it gradually deteriorates, so that less and less resistance is offered. These are not serious objections, however, and need

**Exercise
When
Reclining**

not deter one from their use. The chest-weights and pulley-weights are not subject to this criticism, as they are not elastic.

WEIGHT-LIFTING.—This form of exercising has many variations. Lifting a broom-stick might be called weight-lifting, but it would never develop any muscle. Therefore, weight-lifting, as generally understood, means a system of exercise in which light weights are used for resistance at first, with a gradual progression to quite heavy ones. If one stops progressing when a bar-bell of twenty or thirty pounds can be handled with ease, the exercise will be little more than constitutional and the advantages and disadvantages about to be discussed will not apply. But as a rule, if a person really goes in for weight-lifting, he will continue to progress until he can handle 75 or 100 pounds, or even more. The lighter weights are used chiefly to add interest, and it is usually best for women to limit themselves to such weights. Precautions against injury and strain are especially important in the case of women who make use of apparatus of any sort in sports and exercises, although training will go far in enabling them to avoid accident.

The lifting of heavy weights is a form of exercise of great value in some cases and of questionable value in others. This depends chiefly upon the build and physical characteristics of the individual, but to some extent also upon the manner in which it is practiced. As in many other matters, there are right methods and wrong methods of lifting weights. The prejudice which has arisen in many quarters against this form of exercise is the result of its irrational use. If a man is of a robust or stocky build with bones not too light, then he may profit by intelligent methods of weight-lifting. If he is very light-boned, apparently intended by Nature for the exercise of speed rather than for manifestations of great strength; or, in other words, if he may be compared to the race-horse rather than to the heavy draught-horse, then he might do better to let weight-lifting entirely alone.

The lifting of bar-bells, or large dumb-bells, is unquestionably adapted to the development of the greatest possible muscular strength, and it may be said that practically all of the famous and phenomenal strong men have cultivated their strength through this method, even though some of them later recommend or give instruction in other methods. The heavy

iron bells offer that resistance which is essential to the most powerful contraction of the muscles, and if one gradually increases the weight, adding one or two pounds as the strength increases, one will grow continually stronger until the individual maximum is reached. This method of strength-building has been used since long before the time of the famous Milo of Crotona.

Weight-lifting may be termed a natural form of exercise as compared with various ingenious and sometimes freakish methods taught by some instructors. In a natural state the muscles have to do with moving the body itself or some of its parts, or else with the handling of external objects. In short, the lifting of things is and always has been a fundamental part of everyday life. Weight-lifting as an exercise is a natural development of this everyday activity in handling things. And for purposes of exercise it is not essential that one become a master of all the little tricks in handling bar-bells, though they help to make the work interesting. It will suffice for strength-building purposes to have a general knowledge of the fundamental principles, and this may be gained here. The fine technical points, as in wrestling or boxing, can best be learned from a personal instructor. Sometimes the practice of very simple exercises with a bar-bell will accomplish more in the way of development than the tricks, or feats of strength, as, for instance, in the matter of strengthening the arms. Most lifts in which the arms are ostensibly employed to do the work are really executed chiefly by the strength of the legs, or other parts, whereas in a simple exercise the novice would push up a bell of half the weight by sheer strength of the arm muscles, and in that way develop the arms.

Weight-
lifting and
Natural
Development

Before attempting any form of weight-lifting, however, it is highly important that one should thoroughly understand the proper procedure. Otherwise one may suffer strain, or acquire all kinds of errors of form that will be difficult to overcome later. Unless one understands how to handle both the body and the weight, the movements will be awkward and more nervous energy than necessary will be expended. The "knack" of weight-lifting is important, but it is not all there is to it, as some people imagine. After this has been acquired

one will be able to lift greater weights, but this does not necessarily indicate greater strength, nor will the practice of the "knack" develop greater strength. This requires the use of heavier weights. So no matter how expert a man may become in handling the weights, he will never go very far without strength. "Knack" cannot take the place of strength except to a very limited degree. What "knack" really means is the acquirement of the ability to concentrate the strength in the most effective manner, so as to produce the maximum results with the minimum of effort.

Weight-lifting should never be taken up by the beginner in physical culture. Only after the body has been thoroughly strengthened and hardened by ordinary exercises, is one ready for this form of advanced training. It will then increase the strength still further, provided such weights are used as will offer greater resistance than that supplied by accustomed exercises. For some muscles, gymnastic and resisting exercises may accomplish more than weight-lifting, as in the case of the muscles of the neck or the latissimus dorsi, used for pulling the arm downward, in chinning and on the parallel bars or flying rings. Weight-lifting naturally has to do with pulling upward and pushing upward, although in this one may vigorously employ most of the muscles of the body.

Weight-
lifting and
Moderation

It is not everyone who wishes to acquire the phenomenal strength and development necessary for exhibitions in a circus or theatre. Even the prospective teacher of physical culture will not desire this. Perfect symmetry, grace and activity, combined with normal strength, are better than the extremes of muscular bulk which some exhibiting strong men acquire. As a general thing, therefore, it is not advisable to try to reach such extremes. They are not possible to everyone anyway. Everyone may be physically perfect along the lines of his own build, but it is not every man who can ever acquire the power to raise two hundred and fifty or three hundred pounds over his head with one hand. Such men are born with unusually great possibilities of strength.

If one takes up weight-lifting, therefore, it should be as an exercise and as a means of development, and not with the hope of some day startling the world with the execution of seemingly impossible feats. As in athletic sports the aim

should be physical benefit and pleasure, and not the making of a record, which is impossible for the majority anyhow. One should make up one's mind in the very beginning that one will indulge in weight-lifting with a certain moderation, and use medium weights rather than those which will test the power of the muscles to the limit. This moderation, in most cases, will develop the greater degree of strength, for in going too far one will defeat one's own purpose. It is best to stop before exhaustion is reached and no attempt should be made to lift within ten per cent. of what may be judged to be the utmost limit. Weight beyond one's power to handle with pleasure and convenience uses up too much nerve-energy. As in other exercises, if a sensation of trembling in the muscles is experienced afterward, one may know that the limit at which the expenditure of energy may prove profitable or beneficial has been exceeded.

On taking up the use of the bar-bell, the simple movements for strengthening the entire body should first be practiced, and the bell should be of such weight that it can be handled comfortably and without strain, perhaps twenty or thirty pounds, according to the size and strength of the individual. Of course, one who is strong enough or advanced enough to take up this work will already be familiar with a full system of free movements or calisthenics, and will have taken some developmental exercise without apparatus. By taking similar movements with the bar-bell, adapting them as may be necessary, one can employ every muscle of the body. A bar-bell is preferable to a dumb-bell because it can be used with one hand or both hands, while the use of the dumb-bell is limited. When movements with the lighter bar-bell have become easy a heavier one may be employed. The following movements will do very well to start with, repeating each one from three to five times and increasing the number of repetitions up to ten as the strength grows.

Use of
Bar-bells

1. Standing with the bar-bell crosswise before you on the floor, bend forward and grasp it firmly and while keeping the knees straight pick it up and rise to standing position. Return to floor and repeat. This is for the back muscles.

2. With bar-bell resting on the shoulders at the back of the neck, rise high on the toes; relax and repeat. For the calves.

3. Starting from same position with bell on shoulders, bend the knees and lower the body to a squatting position. Rise and repeat. For the legs, especially the front of thighs.

4. With arms at sides and holding bar-bell across the front of the body, hands in supination (palms upward or forward), flex the arms while keeping the elbows at the sides until the bar-bell is brought up across the front of the shoulders. Then vary the same movement by having the hands in pronation (palms down). This is for the biceps and forearm. The movement may be improved when the hands are in supination by curling or bending the wrists as much as possible during the movement. The exercise should be done slowly, rather than with a jerk, so as to secure maximum resistance.

5. From position with bar-bell in front of shoulders, hands in pronation (palms forward), push the bell slowly overhead to arms'-length, being sure to straighten the arms completely and stretching well up. Slowly return to shoulder position and repeat. This is for the deltoid and triceps, deltoid during the first part of the movement and chiefly triceps during the latter part.

6. Lying on back, bar-bell across the chest, push straight upward to arms'-length. An excellent exercise for the triceps and pectoral muscles.

7. Lying on back with knees drawn up and heels close to the buttocks, place the bar-bell across the abdomen, then raise the hips as high as you can until the body rests on the shoulders and heels. For the back and buttocks.

8. In standing position with feet spread, place bar-bell across the shoulders at the back of the neck, then bend the body from side to side. Same, rotating the body from side to side. For the side abdominal muscles.

9. Lying on back with feet strapped down or held down with furniture, place the bar-bell across the body at the level of the lower ribs, then sit up and lie down alternately. For the front abdominal muscles. As the strength grows the bell may be gradually moved upward toward the shoulders and ultimately placed behind the head.

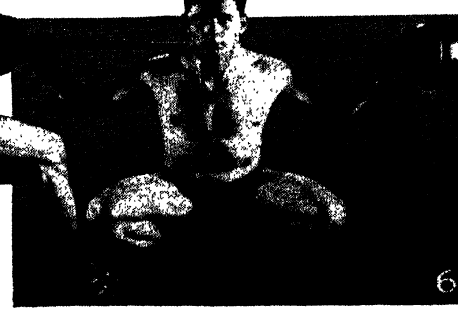
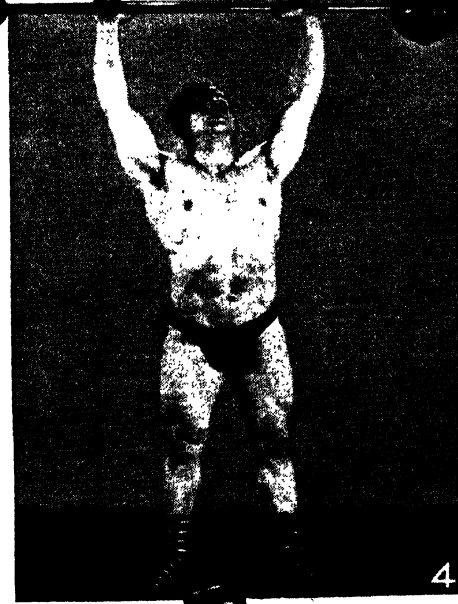
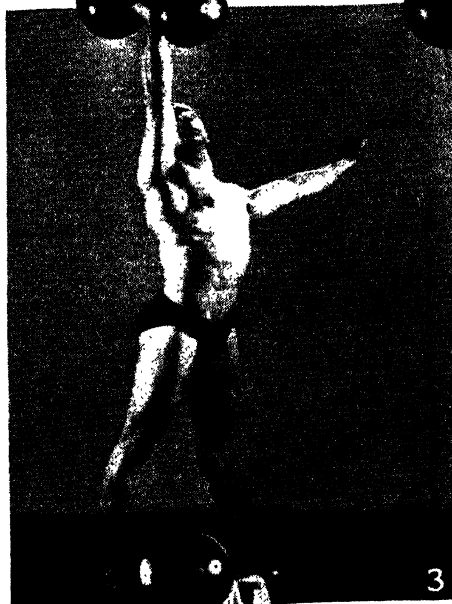
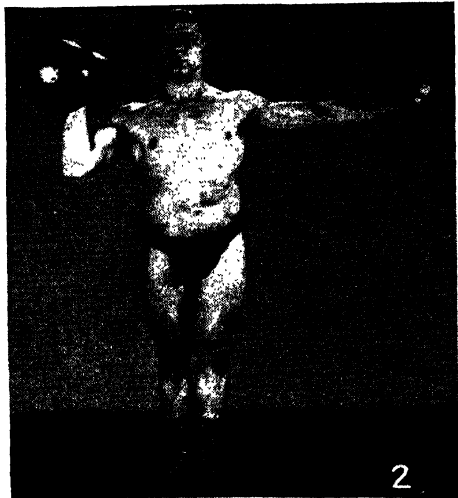
These simple exercises will employ in a general way all parts of the body, and it would be well to practice them for

three or four weeks before attempting any feats of strength in lifting. In executing all of these movements be sure to stretch the arms as far as possible when extending or when raising the weight above the head, and to flex just as far as possible when bending arms or legs. If one will rigidly adhere to this rule of complete flexion and extension of all parts of the body, there need be no fear of becoming muscle-bound through the handling of heavy weights. The muscles will retain their full length and there will be no impairment of the movements of any part of the body. Possibly in the case of extreme development from weight-lifting there may be some such interference, but it will be slight.

In combination with weight-lifting, it would always be well to take some exercise for speed and flexibility to counteract the tendency to become slow. Weight-lifting alone has a tendency to make the muscles slow to act, not because of the resistance of the exercise, or the bulk of the muscles developed, but because the movements must be performed rather slowly. One who never moves quickly will naturally be slow, but if faster movements such as are required for bag-punching, sprinting, boxing and fencing are added, the tendency to slowness will be largely overcome. There are numerous examples of powerfully developed men who are exceedingly quick and active in their movements. At the same time, it must be admitted that one who is built for strength rather than for speed and who specializes in heavy exercise, even if he tries to cultivate speed simultaneously by light quick movements, can never be quite as fast as the man who is built for speed and who devotes all of his time and energies to its development. We develop most along our natural lines and along those lines to which we give the most attention.

Speed and
Strength in
Weight-
lifting

In many feats of strength it is necessary to combine a measure of speed with strength. Practice to attain both will develop tremendous energy. Some moves in weight-lifting should be done quickly; otherwise they cannot be done at all. In a great many cases practically all of the work is accomplished by the quick energetic action of the large muscles of the legs, and the importance of the legs in this connection should be kept in mind. Another most important matter is the necessity of *keeping the back straight* when lifting from the



BAR-BELLS. (For description see next page.)

WEIGHT-LIFTING: BAR BELLS

1. *One Hand Snatch with Body Bent.* Spread the legs, place bar-bell between them and bend body forward parallel with the floor. Have the bar-bell parallel with the body and take hold of it with the right hand, palm to the left. Now with a single quick snatch, raise the bell overhead to position shown, balancing with the left arm and keeping the body bent. The right arm is kept straight and the eye is kept on the weight. This movement is particularly good for the back and side body muscles, though it uses most of the muscles in the body.
2. *One Arm Press.* A straight upward press from the shoulder. The bell is brought to position shown by any method that is convenient, after which it is pressed up to arm's length by straightening the elbow. The other arm is used to help maintain balance. Beginners should keep the legs spread. There is no trick to this movement; it requires pure strength when a heavy weight is used. It is an excellent exercise for the triceps, deltoid and trapezius muscles.
3. *One Arm Snatch, Swing, or Jerk.* Spread legs, place bar-bell between and at right angles to them and secure a firm grip thereon with the right hand as described under 1. For the snatch, the left hand is braced on the left knee at the start and the weight is lifted above the head with a single mighty heave, slightly flexing the elbow, then straightening it and if necessary giving a quick dip with the knees so as to get under the weight. The left arm goes out to the side for balance as the weight rises. For the swing, the legs, back and arm are all kept straight and the weight is lifted by a straight outward and upward swing. The left arm is used the same as in the snatch. For the jerk, the bell is placed at the shoulder as in 2, after which it is "jumped" up to arm's length by bending the knees and then straightening them with a jerk to give momentum to the bell, at the same time pushing upward with the arm.
4. *Two Hand Snatch or Jerk With Bar-bell.* These movements are performed by the same general method as the one hand snatch and jerk but since two hands and a bar-bell are used the hold obtained is somewhat different. The bar-bell is placed parallel to the spread legs and the bar is firmly gripped by both hands, palms being turned backward. The back should be kept straight, bending from the hips. For the jerk, the bar-bell is held in front of the body at shoulder level with arms flexed, palms facing outward. It is brought to this position by a snatch from the floor.
5. *Straight Press up From the Chest.* This may be done lying on the floor or on a bench as illustrated. Place the bar-bell across the chest and grip it with palms facing forward. Press the weight up to arms' length by straightening the elbows. Lower slowly and repeat.
6. *Full Knee Bend.* Place the bar-bell across the shoulders by any method that is convenient, usually by snatching it above the head and then lowering behind the neck. Grip it with palms facing forward. Now bend the knees and lower the body to squatting position. Straighten up.

floor. In bending forward, always bend from the hips, keeping the back straight.

Raising a bar-bell to the shoulders is an easy matter when the weight is moderate, but above a certain point it will be necessary to use what is sometimes dignified by the phrase: the "science" of weight-lifting. This means the concentration of strength to the best advantage. In lifting a heavy bell to the shoulders it means the use of the legs rather than merely the arms. Stand with the feet well apart, perhaps a distance of the width of the shoulders, and take hold of the bar-bell with both hands just in front of the instep or over the toes. In this way you will be well over the weight. The back should be straight, but the knees fairly well bent so as to give a strong upward pull with the legs. Hands in pronation (palms down or backward). Now, using both arms and legs, but chiefly through the effort of the legs, give a straight hard pull upwards (so as to impart to the weight as much momentum as possible), and raise it to the front of the neck and shoulders. Just as it reaches the highest point to which its upward momentum will carry it, quickly bend the knees and drop down a few inches so that you can shift the elbows under the bar instead of over. This should be done very quickly, and the forearms should then assume a perpendicular position under the hands. In short, the bar-bell will then be in front of the shoulders and it will only be necessary to straighten the knees and rise to the upright position. In doing so, take a step back with the right foot, feet at right angles to each other. You are now well balanced and ready to push the weight above the head if desired. Hands will be bent slightly backward at the wrists.

Lifting the
Bar-bell

Lifting a heavy bar or bell to the shoulders with one hand is accomplished by the same quick dip of the knees and a similar forward hitch of the elbow at the right moment, by means of which the elbow and forearm may be brought directly under the weight. In starting a one-hand lift, however, the hand should be in position of supination (palm forward). Practice these movements thoroughly with a light weight until you have mastered them before trying a really heavy weight, and then increase the weight only gradually.

For strength of the arms, as said before, a slow push up is

the thing. With a weight above a certain poundage, however, this is impossible, and it is necessary to use the legs also.

The *jerk*, as it is most commonly called, is the method by which one throws or "jumps" up a bar-bell from the shoulders to arms' length above the head. Simply bend the knees so as to lower the body a few inches, and then suddenly straighten them with a jumping effect, thereby starting the bar-bell upward with great momentum. In many cases this momentum will be sufficient to send the weight all the way up, but in any case it should go up three-fourths or four-fifths of the way, in which event it is only necessary to finish straightening the arms to complete the movement.

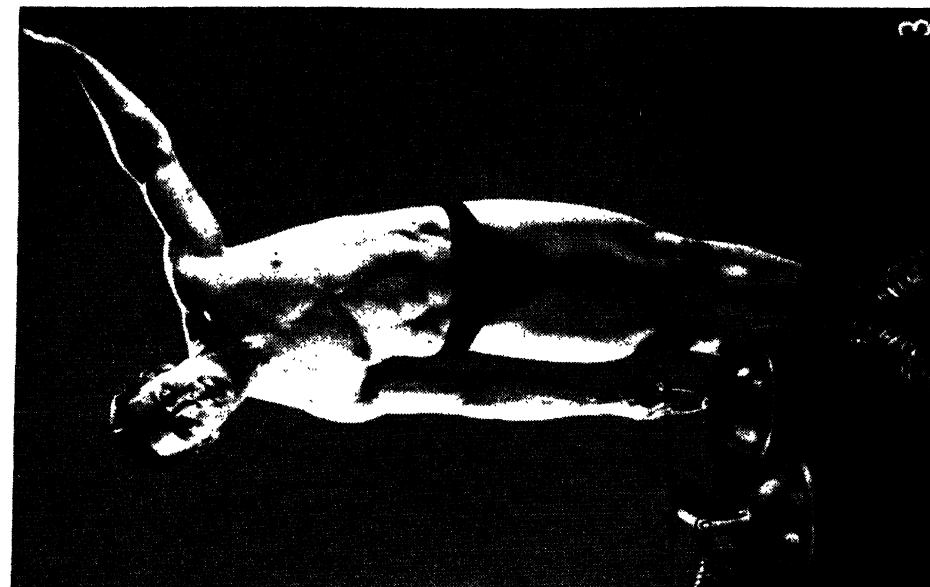
"The Jerk"

With a weight above the head there are two considerations which should *always* be kept in mind, since they are absolutely essential. The first of these is *perfect balance*. Keep the body directly under the weight, which means that the center of gravity should be above a point midway between the two feet. The second point is necessitated by the first, and requires that the lifter *keep his eye upon the weight* at all times when it is above his shoulders. Never for an instant should the eyes be taken off the bar-bell or weight-lifting dumb-bell.

A *compound jerk* is necessary when lifting such a heavy weight that the ordinary jerk will not accomplish the purpose, though this also should be practiced first with a moderate weight. Suppose that with the best possible effort in a jerk you succeed in giving the bar-bell only enough momentum to throw it half-way up, or barely above the top of the head, and that the arms cannot push it up the rest of the way. Then, just as it reaches the highest point attainable by its momentum, quickly bend or dip the knees a second time, dropping the body down under the weight far enough to enable you to straighten the arms under it. Once the arms are straightened it will only be necessary to straighten the legs and rise to a full standing position, watching the bar and keeping the balance carefully. This dip of the knees and getting the arms straightened under the bar must be done in an instant, though after this you can rise by straightening the legs slowly.

The Compound Jerk

In executing the jerk the legs should act with great energy and speed, as though to throw the weight as high as possible. The legs should be bent for this purpose only far enough to



KETTLE BELLS. (For description see next page.)

WEIGHT-LIFTING: KETTLE BELLS

1. *Forearm Lift.* Stand erect, arms at sides, holding a kettle bell in the right hand. Flex the arm, bringing the hand all the way up to the shoulder so as to make the movement complete. This develops the biceps. In order to develop the flexor muscles of the forearm, stop the movement at the point illustrated, then raise and lower the bell by raising and lowering the wrist.
2. *Foot Lift.* Sit upon a stool with hands gripping the sides and knees bent. Place a kettle bell on one foot, then straighten that leg and when it is fully extended, raise the rigid limb as far as possible. This develops all the muscles along the front of the leg and also the deep abdominal muscles. Practice the movement with both legs.
3. *Side Lift.* Stand in position described under 1. Bend the body to the right, lowering the weight as far as possible without raising the left foot, at the same time raising the left arm to shoulder height. Now bend the body to the left as far as possible so as to raise the weight, at the same time lowering the left arm. Repeat several times, then shift the weight to the other hand and practice on that side. This develops the side abdominal muscles. A variation of this exercise is to raise the straight arm, side outward, as the body is bent to the opposite side. The size of the weight and the strength of the performer will determine the height to which the weight can be raised. This develops the shoulder muscles.

get the greatest possible power. To bend them too far would mean loss of power. In the second movement of the compound jerk, however, for getting the arms straightened under the bar at the psychological moment, it may be necessary to bend the knees much more; indeed, just as far as may be necessary to drop down sufficiently to get the arms straight. And always keep in perfect balance.

**The Two-
hand Snatch**

The *two-hand snatch* is a spectacular and interesting feat by which the bar-bell is raised from the floor to a position at arms' length over head in one continuous movement. It is, of course, done chiefly with the energy of the legs, though the back and arms also participate. The back should be straight, bent forward at the hips when taking hold of the bar, and the legs so bent as to give the greatest possible upward pulling power. The lift is made quickly and with great energy, giving sufficient momentum right at the start to send the weight all the way up. In case the weight is so heavy that this cannot be accomplished, then the legs must again be brought into play, as in the second movement of the compound jerk. Suppose, for instance, that with the best effort the bar-bell can be raised only to the level of the top of the head with the first pull upward, then at that point the legs should be quickly bent and the body lowered so that the arms can be straightened under the bar, whereupon the legs can be straightened again and the upward passage of the weight continued without interruption, or at any rate without any apparent or noticeable interruption. If this is done smoothly and effectively it makes a beautiful lift, and all in one continuous movement.

**The One-
hand Snatch**

The *one-hand snatch* is similar to the two-hand snatch, except that it is done single-handed, starting with palm turned backward. It is much more popular and more widely practiced than the two-hand movement. One can lift almost as much and it is more spectacular to see it done with only one hand. It is sometimes mistakenly called a "swing," but the swing proper consists of swinging outward and upward from between the feet, with straight arm, to high overhead. The swing is available for limited weights only, and is of little value except as an exercise for the back. In performing the one-hand snatch with the right hand the left hand may be braced upon the left knee, helping to start the lift, the left arm swing-

ing up and out on a level with the shoulder for balancing purposes as the weight goes above the head. The same dip of the knees and straightening of the one arm is to be employed whenever necessary to complete the snatch, as in the two-handed version of this lift.

The *one-hand jerk* is performed in the same manner as the two-hand jerk, the bar-bell or dumb-bell being first balanced carefully at the shoulder, with the other arm outstretched. The movement of this and those of the compound jerk should be thoroughly mastered before doing any really heavy lifting.

In pushing up a moderate weight with one hand, the strength of the arm is best brought into play if the body is held as nearly motionless as is possible, or consistent with proper balance. But the weight may be put up more easily and a good exercise for the muscles of the sides secured by a certain sidewise swing of the body. Using the right hand, for instance, with the dumb-bell at the right shoulder, first bend well over toward the right side, with the left arm stretched outward and slightly upward. Then bring the left arm down and swing the whole upper-body well over to the left as you push the bell upward with the right hand. This exercise should be practiced with each hand.

The One-
hand Jerk

The *bent press*, so called, is a peculiar method of raising a heavy weight above the head with one hand. It is used with weights too heavy even for the jerk, and consists in causing the body to raise the weight in such a way that to the uninitiated it may seem to have been put up merely by strength of arm. Some remarkable lifts have been performed in this way, but anyone who becomes able to put up his own weight may be well satisfied.

In commencing the bent press with the right hand, for instance, though it should be learned with both hands, it is assumed that the bar-bell is at the shoulder, well balanced in the hand. First bring the weight well back of the shoulder, and with the bar parallel with the line of the back of the shoulders. With a long bar, in other words, the thumb end should pass back of the neck. An important thing throughout is to *keep the forearm absolutely perpendicular* under the weight. Starting from this position, gradually bend down toward the left side, keeping the eyes on the bar-bell, and turning

The Bent Press

the thumb slowly forward, or in other words, turning the palm outward. As the body bends far down, the angle of the right arm at the elbow will gradually widen to a right angle and then, continuing, form an ever-widening obtuse angle. The left arm, first bracing the body on the inside of the left thigh, will gradually slide down, and the bending of the body will continue until the left shoulder comes close to the left knee. Meanwhile, the right forearm, under the weight, has been kept perpendicular and the arm is now almost straight. Having straightened it, with the weight thus above the body, one can straighten up and the feat is accomplished. In short, instead of pushing the weight up with the arm, the body is bent down under it until the arm is straight, or nearly so.

The bent press is usually a difficult thing to learn, and the student need not be surprised if he does not learn it in three months. It seems awkward and unnatural at first, but it is an efficient method, as is proven by the fact that one can lift infinitely more in this way than by any other one-hand method. It should be the last thing to learn in weight-lifting, and one should be very strong before attempting it.

There are a number of fancy tricks, but they are not essential and need not be considered here. Most of these regular feats may be best learned from a personal instructor, but unless he is well qualified to impart his knowledge to others one may do better by following the instructions given here.

ATHLETICS, GAMES AND SPORTS

Section 5

THE central idea of games is play while that of individual sports and athletics is competition. The participant is out to win and will often drive himself to the limit in order to do so. This is not entirely commendable, but at a certain period of life serves a useful purpose. Athletics are best for young adults. They have the energy, ambition and stamina to go through the necessary training and to compete with all their might. This is the natural thing for the young adult to do. He is being prepared for his work in the world. He must have a strong body and a strong mind. He must be courageous, determined, persistent, self-reliant and enduring. Athletics develop all these characteristics and are therefore of the greatest value. Nevertheless, the play spirit should not be forgotten, and every athlete should enter his contests with this idea in mind. He will be able to strive just as mightily but more good-humoredly, and if he loses will not have any feeling of irritation against the victors. The ability to lose without loss of morale is one of the most valuable qualities that can be developed from athletic competition.

The Spirit
of Play

Anyone who will take the trouble to think back to his own childhood will be in a position to appreciate the value of the play spirit. Those were the happy days! If any little trials or disappointments arose they were soon forgotten if one could only *play*. If there was any lack one could "play" that it was supplied. Playing was far more important than eating or sleeping and one never had enough. The instinct for play was Nature urging the child to physical and mental activity in order that it might learn to use its muscles and mind. After maturity is reached this urge is lessened because it is not so greatly needed; but some play is required even by the adult and it is unfortunate that our modern methods of living are apt to completely smother what remains of the play instinct

and also to bring about its decline at an absurdly early age. Some people find formal exercises monotonous, but are willing to play an active game, because there is a mental as well as a physical interest in it. The great value of play is that it gives rest at the same time as activity. This may seem impossible, and it is true that the same parts cannot be both rested and exercised at the same time. But most of our daily activities are more or less alike so that we use the same muscles and the same nerve-centers and, to a certain extent, think the same thoughts day after day. Play allows these parts to rest by calling for activity of others. This not only produces a pleasant feeling of exhilaration, which indicates that all the functions of the body are working more perfectly, but it leads to a more rounded development of the body and even of the mind. The games most often played by adults require more or less thinking and planning, but along different lines from those followed in one's ordinary occupation. The factor of competition also induces mental effort.

**Play vs
Competition
in Athletics**

It is the play spirit which enables one to take a lot of exercise without fatigue, because it stimulates all the functions of the body and prevents loss of nerve-energy by taking one's mind off the problems of life, which are sometimes so perplexing. Constantly turning over problems in the mind without giving them any real attention or when it is unnecessary, always wastes energy. There is nothing like active play to prevent this, or to cheer one up when one is depressed. There are physiological as well as psychological reasons for this. When the mind is concentrated upon play it cannot be occupied with other things, which might be of a less pleasant nature, and when the play takes the form of physical activity the consequent stimulation of the circulation and purification of the blood relieve those nerve-irritations which aggravate mental and emotional disturbance. When indulging in a game without any thought of who may win one feels and looks cheerful and happy, but if there is keen competition a more or less strongly marked expression of anxiety and strain will be visible on the players' faces. So while competition has its uses, it is best from the health standpoint to play the game for the game's sake.

The play spirit helps to keep one young, not merely because

playing is a prerogative of youth but because of the physical and mental benefits already mentioned. Youth depends upon good metabolism, regular elimination of wastes and a cheerful, youthful attitude of mind, and all these are promoted by active games and sports. Play balances work just as sleep balances the waking hours. If adults would only indulge more generally in games, instead of merely watching others play, there would be much less sickness and probably much less meanness and actual crime in the world. When you play with your friends and relatives and neighbors, you cannot feel any great animosity toward them, at least not for any length of time. Children may quarrel, but they soon "make up" and the comradeship of their games has much to do with this quick forgetting. Of course, under the present conditions of living, it is not everyone who has the opportunity to indulge in games. It is a pity that we could not substitute games and folk dancing for ballroom dancing and active games for cards, and that facilities could not be supplied for all the "fans" to play their favorite game instead of spending all their time watching the home team. Even under these favorable circumstances, however, it is more than likely that many would fail to take advantage of their opportunities out of sheer laziness or mistaken ideas of dignity. It would take time to overcome the habits of years and to educate people to the value of games and the play spirit.

**What Is
Training?**

In order to balance completely the exercise regimen some games should always be included. Those who indulge frequently in such activities, especially if they vary the games employed, may not need any other constitutional exercise, although developmental exercise will still be needed if the greatest strength and symmetry are to be obtained.

You should never allow yourself to be deterred from playing games because you do not seem to be able to develop expertness. Many inept players exist, but they get just as much health benefit as those who play better. Those who play for health do not mind playing with novices or those who are awkward. There are always some large-souled individuals who will accommodate you by playing with you. Play whenever you have the opportunity whether you know much about the game or not. The more you play the more expert you will

become, so that you must finally reach the point where you are at least passable and in the meantime you will have been improving your health. Another thing to remember is that fancy equipment, stylish sports clothes and membership in a country club are not necessary. The youngsters on the back lots get more good out of their baseball than the "big leaguers." If you have not the opportunity, the equipment or the ability to play one game, play another, but *play!*

It is not the mere participation in athletic contests which develops all these valuable attributes, but the preparation for the same. Training is an inseparable part of athletics and sports. Training means self-discipline—the rigid adherence to a carefully mapped-out plan of living designed to develop maximum strength, endurance and skill. It teaches the athlete how to live and should get him into the habit of using his knowledge. It is an unfortunate fact, however, that most athletes and trainers allow themselves to assume that training is necessary only when preparing for a contest, although those who have attained to a championship have almost invariably learned that they must keep in training all the time.

Training and taking part in contests will generally give the young adult all the exercise he needs, just as playing games gives the normal child all the required muscular activity. Some special exercises may be of assistance, however, in producing a more rounded development, or in further developing muscles needed in the particular form of athletic activity in which the individual is interested. Also, light games which do not require great exertion, but which supply considerable mental interest and emphasize the play spirit, are of distinct advantage. Of course, one should never overdo any kind of exercise, and if such additional activity seems to be too much it had better be omitted. It will generally be observed, however, that one makes out better in the end if one does not give one's entire time and attention to one's particular specialty or specialties. Practice is essential, but monotony must be avoided. There is as much danger of overtraining as of undertraining.

In considering the value of athletics the question always arises as to whether it is wise to devote oneself entirely to a particular form, or whether one should interest oneself in several. It is agreed that specialization will be more likely to

lead to a championship, but is this of any permanent value? After all, the fundamental idea back of athletics is not the winning of a championship but the preparing of an individual for the game of life. Specialists are needed in this game also, but balance is of even more importance. Specialists are likely to get the habit of viewing everything from one angle. They seldom reach the highest positions, and when they do their reign is short-lived. They lack adaptability. So it is with the athlete who gives all his attention to one form of activity. It is much better to take part in several, each of a different kind, as thereby a more rounded development and greater endurance will be attained. It will be noted that winners of the event known as the pentathlon are not very heavily-muscled or noted for strength in any particular part; they are well-rounded and have, above all, endurance, and that means strength of heart, lungs and all other vital organs. By taking part in several events one may forfeit a championship in sport, but will be more likely to win one in real life. There is no objection to giving particular attention to some form of athletics for which one is naturally fitted, but some attention should also be given to other forms. The latter may be made subordinate, but should not be neglected entirely. One will secure more real joy and benefit from having a variety of interests than by concentrating on one, as not only monotony but also over-anxiety is thereby avoided.

Specialization
in Sports

There are many kinds of athletics, some mild and some strenuous, so that no one need go entirely without such activities. Some have constitutional and some developmental effects, while others are on the border line, and one should choose what best meets one's needs. For those not sufficiently vigorous to indulge in any form of competition there are the individual sports, such as canoeing, fishing, horseback riding, roller-skating, etc. There may be some who find it impossible for one reason or another to give sufficient attention to sports and athletics to secure all the exercise they need. They will, of course, have to take some other form of exercise, but they should make every effort to include at least one sport in their program. Many may feel that they have no opportunity to indulge in sports and athletics, but "where there is a will there is a way."

Most young adults will find that schools offer them the greatest opportunity for participating in these valuable forms of muscular activity. All schools, public and private, give considerable attention to athletics, and all students are invited, and to a certain extent required, to take part. Some students may not have as much time for these activities as others, but they should do what they can. The number of years spent in school by the average young person is constantly increasing, and with this comes greater opportunity to secure the benefits of athletics. For those who cannot attend school there are many other openings. There are the Y. M. C. A.'s, the Y. W. C. A.'s, athletic clubs, gymnasiums and various neighborhood clubs. Even the churches are now going in for athletic associations. However, an organization is not absolutely essential. Any group of young people can get together and compete among themselves. Often a young man will start training on his own account, with information obtained from books, and will enter competition independently at some of the public meets. Many a champion has started in this way. So anyone who is sufficiently interested and determined will find some way open to him.

**Organizations
That Foster
Sports**

In considering organizations the subject of amateurism and professionalism arises. What are their advantages and disadvantages? As a general rule it is better to remain an amateur. Openings for professional athletes are limited and only the best make any money. It is a profession that few care to follow all their lives. One cannot continue in competition indefinitely and must sooner or later take to teaching, if not to something further removed from the field of sport. Of course, one can be a professional temporarily; but this bars one from future amateur competition, and if one has been sufficiently successful to make some money one is likely to become dissatisfied with other pursuits. Since the majority will have to take up some other vocation sooner or later, the years devoted to professionalism are to some extent wasted, for the same amount of health benefit can be secured as an amateur. The amateur usually gets more fun out of his efforts and is not so likely to injure himself through strain. When one's living depends upon winning, one is more likely to risk injury and to force oneself to the limit. While it is true that

much could be said on both sides of this question, it is well to remember that the primary reason for indulging in sports and athletics is to build health and efficiency, and not merely to make money. No possession is more important than health, and this fact should never be forgotten.

It has been said that sports and athletics are for young adults, and while they are peculiarly suited to the needs of such persons it does not follow that younger and older persons cannot also get benefit from them. The milder sports can be enjoyed by anyone. The various running races, swimming, skating and snowshoeing may be adapted to the needs of all ages. Even boxing and wrestling, especially the latter, may be engaged in by children and older men. In the case of children it is merely a question of limiting the length of the races or the bouts, so that there is no chance for exhaustion to occur. The element of competition is still valuable. But after the age of thirty-five it is well to eliminate competition to a large extent, or to get the participants so saturated with the play spirit that they will compete only in a happy-go-lucky manner. After this age there is greater danger of strain from extreme competition. Of course, there are always exceptions, but this rule applies to the majority. It is true that if people would live rightly at all times the age of competition could be well advanced; but considering that most men and women are still inclined to live as they please, except for short periods, it is better to leave the age limit at thirty-five. No one need stop suddenly, however, and all may continue to indulge mildly for a more or less indefinite period. A little athletic competition tends to keep one living more rationally and acts as a check on one's condition. If a person finds that it is becoming difficult for him to do things that formerly were easy, he will be more likely to seek the cause and remove it, thus postponing deterioration.

Age an
Important
Factor

There is in many countries a great interest in sports, as is indicated by the large crowds which turn out to view contests and the high salaries of some professional athletes. People pay money only for that which interests them. All newspapers give considerable space to sports and maintain a large staff of sports writers. The unfortunate thing about this interest is that it is allowed to dissipate itself in looking on. If people

would take as much interest in participating in sports and athletics as they do in watching others perform, the general health of the nation would greatly improve. One of the purposes of this Encyclopedia is to arouse more of such interest. Among the various forms of these activities to be discussed in this section there certainly will be one or more that will appeal to each reader, and if he or she will then take steps to enter competition, improvement in health will be sure to follow. For ease of reference they will be taken up in alphabetical order, and each will be discussed as to its nature, health value, and particular advantages, and some suggestions will be given for developing expertness. In many forms of athletics personal instruction and coaching are essential; but even so the suggestions here given will be of value, for they will give special emphasis to matters which are often neglected by ordinary coaches. Before proceeding to this discussion, however, the important subject of Training will be considered. Proper training is the essence of athletics.

**Personal
Supervision
in Training**

ATHLETIC TRAINING.—The first thing for every prospective athlete to remember is that training is a personal matter and must be adapted to the individual's needs and peculiarities. There are certain general rules which hold good for all forms of athletics; similarly there are general rules of training for a particular event, but in the application of the latter especially there is need of careful adaptation to the individual. This is the reason that personal supervision is advisable and usually necessary. Some persons who have a good knowledge of physiology and hygiene may be able to do their own adapting, but even in these cases two heads are better than one. The suggestions given here for training are necessarily general.

In starting any form of exercise the important point is to begin gradually. The first day's activities should be well within the strength, as should also be the amount of daily increase.

It is best to make haste slowly. Overdoing leads to stiffness and sore muscles and only causes delay. The exact amount of practice that may be indulged in the first day will depend upon the strength and endurance of the individual and his previous habits in the matter of taking general exercise. One should never do so much that the muscles tremble after-

ward, or that recuperation does not take place after a night's sleep. The tendency of most beginners is to overtrain. They are so anxious to see or show what they can do, that they over-exert themselves. They do not feel this so much the next day, but after a few days they find that they cannot do as well as on the first day. In training for any event one should not put forth one's best effort more than once a week. In long-distance running the full distance is seldom covered during training. When it is, the pace is kept very moderate. The building of strength and endurance depends upon a gradually increased amount of work and not upon exertion to the limit every day. It is necessary to keep a reserve of nervous energy, for in competition it is the man with the most reserve who generally wins.

This brings out the important point that endurance is of more importance than strength in athletic contests. This is true even of such strenuous exercises as throwing weights and wrestling. Strength is required to be sure, but it must be backed up with endurance. In these contests there are many trial heats and one must be able to do practically one's best many times in succession. In wrestling endurance is needed for each bout, as well as for lasting through all the bouts. As has already been explained endurance is a result of large heart and lung capacity, together with plenty of nervous energy. These can only be developed through carefully graded exercises, together with plenty of sleep and right living in general. The athlete who expects to develop his maximum endurance merely by practicing his specialty is doomed to disappointment. In an event like putting the shot or throwing the discus, for instance, there is little in the exercise to build endurance. This must be done by cross-country running, or rope-skipping, or some other form of moderate long-continued exercise. Even in the case of a sport like rowing, which does in itself build endurance to a considerable extent, it is often well to add some running to the training regimen. Then it must be remembered that endurance comes not merely from creating a demand for it, but also from supplying the necessary elements to meet that demand. These include air, sun, water and food. This is where right living comes in.

Athletics and
Endurance

The difference between ordinary training and the kind

herein advocated is largely a matter of food. And yet no special diet is required. It may seem like a special diet, but it is really only the natural diet that everyone should follow who desires to remain in good health. There are no particular foods which in themselves build strength or endurance. It was formerly thought that athletes should have plenty of rare meat in their diet, and some advocated eating it raw. While this idea has been largely outgrown, many trainers still permit the use of white bread, white sugar and other denatured products in the diet of their charges.

Overeating

The wisest athletes avoid overeating, which wastes energy and lessens both endurance and strength. Nerve-energy, which is the basis of these qualities, is a product not merely of food but of air, sunlight, water and sleep. Moreover it is not built so much from the proteins, fats and carbohydrates—those elements formerly considered to be all there was to food—as from the mineral elements and vitamins. Of course protein is needed to build tissue, and carbohydrates and fats to supply energy, but *these elements will not be rightly utilized by the system unless the diet also contains a sufficient amount of mineral elements and vitamins.* Fresh fruits, salads and all raw foods, therefore, are very important. Those who know no better may consider them mere appetizers and devote themselves to meat, white bread and boiled potatoes, but they will not make the best athletes. Strenuous exercise helps to counterbalance many errors in diet, but there will still be a loss of nerve-energy. The athlete who wishes to be at his best will use the normal diet of fresh fruits, fresh vegetables, nuts, whole grains and dairy products, including eggs. Bread, cereals, rice and other grains should be used in their unpolished and natural form. Meat is permitted, but as a rule three times per week should be the limit and it should not be taken at the same meal with eggs, nuts or cheese. One heavy protein per day is enough for anyone. The advantages of the low-protein diet, particularly of the vegetarian diet, for producing endurance, have been amply proven.

After having enumerated the articles included in the normal diet it should not be necessary to list the forbidden articles, but for the sake of emphasis this will be done. Tea and coffee are generally excluded even by those who know

little of diet, but they neglect to exclude spices and condiments, smoked and pickled foods, refined and denatured products and rich desserts. Ice-cream is permissible in moderation, but it should be home-made of milk, cream and honey, with fruit flavoring at times for variety. The refined and denatured foods include all white-flour and white-sugar products, cereal products which do not include the whole grain or which are excessively cooked, potatoes boiled without their skins, and condensed or evaporated milk.

It is possible to produce bad effects by overeating even when living on natural foods. There is a particular tendency to overeat on cereals, sweet fruit and nuts. Such overeating should be carefully avoided, while thorough mastication should be practiced. For further instructions on proper eating see the volume devoted to Diet. The athlete should eat the same things as others, except that he is allowed a somewhat greater quantity of foods and a larger proportion of the carbohydrates.

Kinds of
Foods

Having arranged the diet correctly, it is well to plan the other habits of living before proceeding to actual practice of the exercise. It goes without saying that plenty of sleep should be secured. Early to bed is a rule insisted upon by all trainers, and this is well; but all do not give sufficient attention to rest and relaxation during the day. Every period of activity should be followed by a period of rest. This does not mean bed rest, but it does mean perfect physical relaxation. Many athletes have concentrated so much upon exercise and doing their best in competition that they have forgotten how to relax. They should learn how to let go at a moment's notice, and how to avoid tension in one part of the body while using another part. The ability to relax greatly increases endurance. See *Relaxation* in the section on *Constitutional Exercise*. Proper balance between activity and rest is the secret of progress in building up the body for competition.

Fresh air day and night and a good supply of pure water are just as important as proper food. One usually perspires considerably in practicing for any athletic event, and this loss of water must be made up by drinking. Sports such as weight-throwing and the various jumps do not induce deep breathing, and some special breathing exercises will be necessary in order to get the benefit of the fresh air and to develop the lungs for

added endurance. Sunlight is another very important factor. It is not only a direct source of energy but aids in the assimilation of food and in the action of the glands. All too often you will see athletes going through their training while bundled up in heavy clothing, so as to "sweat off weight" or to prevent "chilling." One cannot sweat off weight, only water, and this is soon regained unless the intake is kept below the body's need, which would be very unwise; and if continually bundled up one will never develop the resistance to prevent chilling. The thing to do is to take all exercise and, in fact, to go about at all times, in the minimum of clothing, so as to get the benefit of the sun and air on the skin. Once or twice a day in the summer the entire body should be exposed to the unobstructed rays of the sun, following this with a cool bath. The body must be accustomed to the sun gradually, however, so as to avoid burning.

Tobacco and
Alcohol, and
Athletics

It is scarcely necessary to mention that tobacco, alcohol, medicines and all energy-wasting habits must be strictly avoided. Complete sexual rest is to be observed, and the mind should be kept away from sexual matters as much as possible.

Having arranged the general plan of living, which is to be followed out day after day in order to supply the necessary foundation for building strength, endurance and dexterity, the next thing will be to practice the particular form—or forms—of athletics in which one is interested. As already stated, it is well to begin gradually and progress slowly. The chief attention at first should be devoted to the perfection of form. There is a proper stride for the different running races, a correct manner of handling the body in the different jumps, especially the pole-vault, a certain technique in throwing, various strokes in swimming, and many special holds and blows in wrestling and boxing. One cannot do one's best without good form, and this is the result of many carefully performed movements. There should be no competition at the beginning of training, and no trying to see how much can be done. All the attention and effort should be directed toward practicing the various movements required until they become second nature. Only when these movements can be performed without thinking about them will the athlete do his best, for then the mind can be concentrated upon putting forth effort. If

the mind is divided between the movements and the effort, both will suffer. It is well known that a person learning to swim expends much more energy in getting through the water than one who has learned to make the motions smoothly and in coordination, and yet he cannot go as fast. The same is true of all other forms of athletics.

In training for any event it is well to vary the activity as much as possible, to prevent both monotony and excessive fatigue of certain parts. For instance, in sprinting the start is very important; but if one spends all of many training periods in practicing starts one will tire of them and lose efficiency. Starts should be alternated with running at various distances and speeds. In preparing for an event like throwing the javelin, which is all done with practically one motion, variety is obtained by using special exercises for developing the throwing muscles and running to develop endurance. It is not advisable to limit one's interest to such a highly specialized exercise.

After one has developed good form one will be surprised to see how well he can perform without making any strenuous effort. When this has been accomplished, it will be permissible to concentrate on trying to improve one's records, and to enter competition to gain actual experience in performing "under fire" as it were. One should never force oneself to the point of exhaustion, however, even in competition. One may be competing for "the school" or "the club," but these organizations can never recompense for injury suffered as a result of strain. One should always do one's best, but this best should be attained by careful training, so a good performance may be turned in without exhaustion. It is not so important to win as it is to build health.

Varying
Sports

The tendency to overtrain should be watched, just like the tendency to forcing in competition. In his anxiety to be at his best many an athlete has gone "stale." As long as exercises are performed with keen enjoyment, however, there will be no danger of overdoing. After one has had a little experience in training he can tell fairly well how much should be done at a time. One is not exactly the same every day, and it may be necessary to do a little less some days and a little more on others. The heavy type of athlete, rather phlegmatic in

disposition, can usually stand a lot of heavy exercise, while the lighter type, in which the nervous system is more prominently developed, must limit himself to lighter "work-outs." When it comes to endurance, however, the lighter type will often surpass the heavier. Much depends upon the rapidity with which energy is expended, and this depends upon the degree of mental concentration and the capacity for relaxation. See *Fatigue*.

When the time for the contest draws near a rest period is necessary. It is customary to discontinue all heavy exercise for several days before a contest. Walking is permitted, but most of one's time should be devoted to sleep, rest, deep breathing and such diversions as will be interesting but will not require any great physical or mental exertion. Nothing will be lost by this rest period; on the contrary much will be gained. All that has been learned of proper form will be retained, and at the same time a store of energy will be accumulated which will enable one to do better than ever before. On the day of the contest it is important that one should eat lightly. Some sweet fruit, a little honey and milk, will supply the body with energy-producing material and water, and will be all-sufficient. Nothing that takes much time to digest should be eaten, and nothing whatever should be taken for three or four hours before the contest. It is very important that the stomach be empty and that intestinal digestion and assimilation be completed. A full stomach makes one short-winded, and digestion requires energy. No one need fear being weak for lack of food, for the body always contains a reserve and the food actually used on any day was mostly eaten on the day before.

Foods
and Rest

When it comes to the actual competition there is one other factor to be considered. This is the mental attitude. Of course, all through training one should maintain a calm, confident mental attitude, never entertaining any thought of fear as to the outcome. There may be a tendency on the part of some to worry about possible accidents, or about doing too much or too little, or about apparent slow progress; but when a person trains properly he will be healthy, and healthy persons are not inclined to unhealthy imaginings, fear or worry. When ready for the competition, however, even the most phleg-

matic will feel some excitement, and this leads to tension and a waste of energy. The mind should be kept off the contest as much as possible until the time for the effort comes. Just as it is necessary to stop exercise several days before a contest in order to accumulate a reserve of energy, so is it necessary to stop thinking about the matter for an equal length of time, in order that, at the moment of competition, all the power of the mind may be focused upon the attainment of the desired end. It will not be necessary to think about the motions one is going to make, as proper training will have rendered them habitual, but it will be necessary to visualize the end in view and to see oneself coming out "on top." In a contest such as boxing or wrestling, where brains are necessary as well as brawn, every blow and every hold will be an individual objective to be treated as just described. Full attention should be given to the business in hand, with never a thought of failure. The temper must always be under strict control. If it is lost, so is the athlete, nine times out of ten. The attention should be so concentrated upon what needs to be done that one is unconscious of one's feelings, the audience or anything going on outside the immediate field of action. By thus backing up the physical effort with the right kind of mental effort the maximum results will be secured. Everything starts in the mind, and unless the athlete can see himself doing what he wants to do he will never be able to do it. Mental training goes hand in hand with the physical.

**The Mental
Attitude and
Competition**

ARCHERY.—Many who read this may think that archery has been out of date since the Middle Ages and that no one pays any attention to it any more. Of course the bow and arrow are no longer used in war except by the most primitive people, and among civilized nations they are used for hunting by only a very few who have made a hobby of it. But as a sport archery is quite popular in many countries. There is a national association in both the United States and England, and tournaments are held every year. Archery is practiced to a considerable extent in most women's colleges, yet it is by no means a womanish sport. It requires a fair degree of strength to draw a fifty- or sixty-pound bow and plenty of endurance to take part in a tournament, when as many as 288 arrows may be shot. Some idea of the power of the long-

bow, and of the strength and skill necessary to use it, may be gained by observing the penetrating powers of the arrow. An unheaded hickory arrow may be made to penetrate an inch pine board. When furnished with a sharp head it will bury its entire length in a large animal, and it is comparatively easy to shoot completely through a rabbit lengthwise. Steady nerves and a fine degree of coordination are necessary for such shooting, and even for target-shooting.

The amount of general exercise secured from target-shooting is very small. There is only a little walking and body-bending. Most of the exercise calls only for the use of the arms and shoulders; yet the sport has more health advantages than are at first apparent. It is practiced out of doors, and any sport which has this advantage may be commended in these days of indoor living. Shooting is excellent exercise for the eyes, and the training of eye and muscle to perfect coordination develops self-control. Then there is the mental interest, which is considerable. Archers are archers because they like it, and this fact adds to the value of the sport. Naturally, one should not confine one's athletic pursuits to archery alone, but the use of the bow and arrow may well be included in the exercise regimen, especially in the case of older people, since patience and skill are required. Younger people, if they are going to use the bow and arrow, will probably prefer hunting, as it calls for more activity and greater hardihood.

Advantages
in Archery

The equipment required for archery as a sport includes the longbow, the arrows and the target. Arm-guards, leather finger-tips and a quiver can also be included, especially for women. Men have a tougher skin to resist the friction of shooting, and numerous pockets to take the place of the quiver. Bows vary in material, size and "weight." The weight of a bow is the number of pounds of force necessary to draw "home" the arrow. Bows may be made of one kind of wood or of two kinds glued together. For general use the latter is usually the more satisfactory, though such a bow may also be made of two pieces of the same kind of wood. Yew is preferred in England while lance or lemon wood is the favorite in the United States, as it is less affected by the climate. A bow may be from 5 to 6 feet in length and 40

to 60 pounds in "weight." It is best to use a bow that one can draw easily, as one will have better control of it. Forty or 45 pounds will meet most needs.

The size and weight of the arrows used should vary with the size and weight of the bow. The length may be from 24 to 30 inches. The length should be such that when the steel point comes to the back of the bow the fingers will press the chin just below the line of the eye. An arrow too light for the strength of the bow will not fly true. The best arrows are made of two kinds of wood, with the heaviest near the tip to take up the shock of impact, and are tipped with a steel cylinder, nocked with horn or gutta-percha and feathered with peacock feathers.

The target is generally made of rye straw, twisted into a rope and then sewed in spiral form into a flat disc about four feet in diameter. It is covered with canvas or oilcloth, on which the scoring rings are painted. The center is called the "gold." The other rings are red, blue, black and white, the white being farthest from the center. An arrow entering the gold counts 9, the red 7, the blue 5, the black 3, and the white 1. The target is mounted on a wooden tripod at a height which brings its center just four feet above the ground.

The Target

For best results in shooting three things are necessary—proper care of one's equipment, an understanding of the "Point of Aim" and correct technique in drawing and loosing. The care of equipment includes keeping it clean and dry, and in good repair. The "Point of Aim" is that point on the target which the archer sees in looking over the point of his arrow when the latter is elevated so that if perfectly shot it will hit the gold. The exact location of this point will vary with the size of the archer, the power of his bow and the length of the range. Once this point has been determined for a given target, however, the archer will be sure, by covering it with the point of the arrow, of hitting the target. In the actual shooting the loosing of the arrow is the important point. The fingers should not be merely spread, but should be pulled smoothly off the string by the shoulder muscles.

There is more to good shooting than would appear from watching an archer in action. There are many fine points which must be carefully learned and persistently practiced if

one is to become expert. Success in archery is essentially a matter of skill, and this takes patience and experience; but of course that adds to the mental interest. A personal instructor is advisable.

BAG-PUNCHING.—Bag-punching consists in punching an inflated leather-covered bag which is suspended from a platform. There are many blows, both plain and fancy, which may be used, so that to be a good bag-puncher considerable skill is needed. This requires practice, but the progress made and the seeming aliveness of the bag, which requires one to be constantly on the alert, will maintain interest. Bag-punching is really a fascinating as well as a health-building sport, and its mental interest is one of its most valuable points.

Ordinary and
Fancy
Punching

There are two kinds of bag-punching, the ordinary kind and fancy punching. The former aims to develop strength, agility, endurance, coordination and all that goes to make up the well-developed body; the latter is chiefly for exhibition purposes and requires speed and coordination, with some endurance but not so much strength. The ordinary variety is best for general purposes.

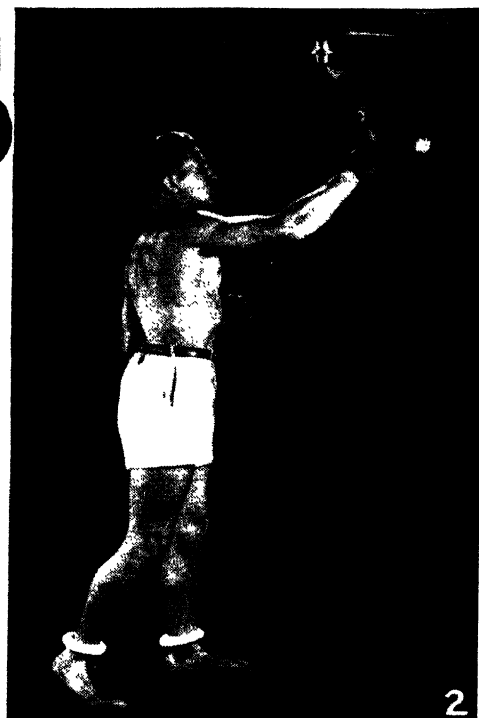
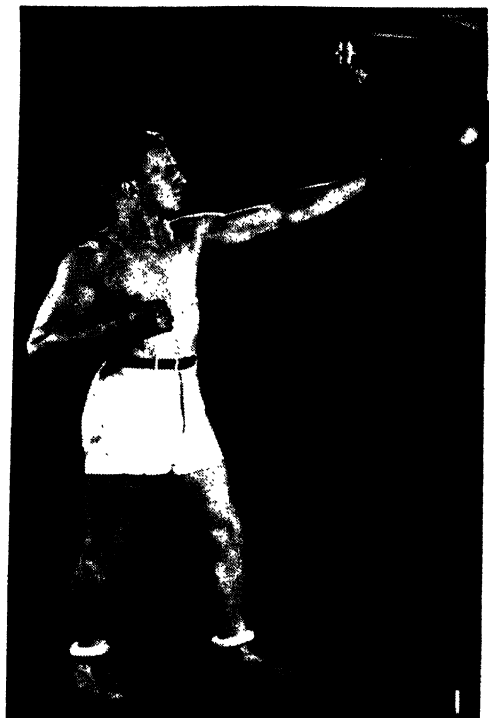
To the onlooker this form of bag-punching may seem to be mostly an exercise for the arms and shoulders, but as a matter of fact practically all the muscles of the body are used. Considerable body-bending is required in "getting over" the various blows. The legs are exercised in stepping about the bag and in shifting from side to side. Even the neck is used to some extent, as the head does considerable bobbing about. There is a method of punching the bag by butting it with the head, but it is not much used and there are better ways of exercising the neck. This general exercise induces deep breathing, and if the punching is done out of doors all the benefits of constitutional exercise will be obtained. In addition, one learns to handle the fists, and this acquaintance with the art of self-defence develops self-reliance. Every boxer makes use of the punching-bag, and every man could include it to advantage in his exercise regimen.

The one drawback to bag-punching is the noise that it makes use of the punching-bag, and every man could include ever, the best place to punch the bag is out of doors, and here the noise has a better chance to dissipate itself without dis-

turbing others. The platform from which the bag is suspended should be made as heavy and solid as possible in order that the rebound may be true. It should also be large enough so that the bag will not hit the very edge. The usual bag employed is pear-shaped and leather-covered and has a rubber bladder. It should be blown up quite tight. Gloves may or may not be worn, as desired. Usually it is well to wear them while learning, as the blows will be truer. They may be discarded afterward if desired, but this should be done gradually, as the knuckles harden. Some bags have attachments at each end so that they may be suspended in a doorway with an elastic cord attaching them to the lintel and the floor. This arrangement has the advantage of making little noise, and is therefore good for home use; but one cannot use many different blows with it, so that the benefits of the sport are somewhat limited.

There are various points to keep in mind when taking up bag-punching. First, the bag should be suspended at a height which will permit its being struck with but little lift of the arms; that is, one should be able to strike straight out from the shoulder. To ascertain the proper height at which a bag should be suspended, stand so that it will hang directly over one shoulder. The bottom of the bag should touch the top of the shoulder. This will insure one's ability to strike the bag with either a straight lead, a swing or hook with the hand on a level with one's shoulder.

One should stand at a distance from the bag that will permit reaching it easily, yet not so close as to be crowded when it rebounds. The exact distance will vary with the reach of the individual and the particular blows being used. One will have to stand in much closer when using the elbows than when using a full-arm swing. It is important to clench the fist properly. The ends of the fingers should be pressed into the palm in such a way that the knuckles will be on a straight line. As in boxing, the knuckles are closed evenly into the palm of the hand and the thumb brought over on the top of the fingers so that it remains between the first knuckle joint and the second knuckle joint. In other words, it is in the center of the fingers it covers. This helps to make the fist solid and compact. When the closed hand is used for driving



1240 PUNCHING BAG. (For description see next page.)

PUNCHING BAG EXERCISES

1. *Demonstrates a Left Lead.* The bag should be adjusted to the most comfortable height, usually about on a level with the shoulders. Standing about three feet from the bag, left foot forward, strike the bag vigorously, allowing it to rebound before repeating. Reverse position of the feet and lead with the right hand.
2. *Shows a Right Hand Hook.* The blow is given from the shoulder, swinging the body with it and shifting the weight to the forward foot. The bag is struck somewhat more to the side than in the case of a straight lead. Allow the bag to rebound and alternate with a left hook.
3. *The Tattoo.* Stand close to the bag, legs spread, fists closed with palms turned down. Tap the bag sharply and quickly, alternating left and right hands at each rebound. The rhythm of the tattoo may be varied by modifying the speed and regularity of the blows.
4. *Striking with the Elbows.* Stand close to the bag with the fists clenched and flexed elbows raised level with the shoulders. Strike the bag with the elbows, alternating left and right, and swaying the body with each blow. Repeat the blows after the second or third rebound at first until speed is gained, when the blows may be repeated at each rebound. For further variety, fists and elbows may be alternated in striking the bag. Also one may turn the back to the bag and strike it with the backs of the elbows.



Proper method of gripping a baseball bat. Some prefer to hold the bat with hands farther from the lower end.

in any sport, it should be kept tightly closed at the time it meets any object. This serves as a precaution against the breaking of the numerous small bones of the hand. It is well to keep the nails fairly short.

Remember that bag-punching is essentially a matter of skill and that it always takes time to develop skill. So be content to go slowly—master the simple blows first and do not be in a hurry

to start the fancy ones. They are more interesting but no more valuable from the health standpoint. Take your time in delivering the blows, so as to avoid tension. Do not punch too long at the start, as fatigue also induces tension and hinders progress—ten minutes at a time is generally long enough. This can be increased gradually up to almost any length of time desired, as, when one becomes expert, the movements become easy like those of swimming. There is another analogy that may be drawn here between bag-punching and swimming. Breathing is important in both instances. Bag-punching requires considerable mental concentration. There may, therefore, be a tendency to hold the breath, and there is always an inclination to breathe irregularly. For this reason one should practice breathing regularly and deeply when first trying the various blows. In this way the habit will be formed and the puncher will have more endurance and will receive more benefit from the exercise than if he had neglected this point. Another important point to remember is always to maintain balance. Never make such wild swings, or deliver such powerful blows, that you are thrown off your balance. This not only looks bad, but forms a habit which will be a handicap if one ever takes up boxing. The idea is not to see how much you can punish the bag but how perfectly

you can control both the bag and your blows, making a smooth and beautiful performance.

The illustrations given herewith show some of the simpler blows which will introduce one to bag-punching. Others easily can be devised from these, but it will be time enough to take up fancy blows when the fundamental ones are mastered.

BASEBALL.—It seems peculiarly fitting that this most popular of all American games should come first on our list,

especially since its popularity is now spreading over the entire world. Baseball is becoming a universal game. No doubt the chief causes for its popularity are its primitiveness and simplicity. Throwing and hitting a ball constitutes one of the most ancient forms of play. There are many variations of these fundamental movements, but they appear in one form or another in practically all ball games. For ordinary playing the rules are quite simple and one can enjoy a game and play fairly well without any very special training. Of course, for professional or even amateur competition, more detailed and complicated rules are followed and more experience is required. The simpler game can be played by the young and the old, the high and the low, the male and the female, both indoors and out. While it is not a perfect game from the health standpoint it has many advantages, and the universality with which it is played makes it important.

The chief health value of outdoor baseball lies in fresh air and sunshine obtained and the exercise secured from run-



Proper grip when preparing to pitch a slow ball.

Popularity
of Baseball

**Health
Values of
Baseball**

ning. There is no need to enlarge on the health value of fresh air and sunshine. Running is of value because of its powerful influence on the circulation, its "agitation massage" of the abdominal organs, and its production of endurance through the development of the heart and lungs. However, the amount of running secured by any one player in a game is not likely to be large, though it may be strenuous. Most of the running is in the form of sprints between bases, 30 to 120 yards, but some running is necessary in recovering a batted ball. The other two major movements of the game, throwing and batting, have little effect on the health. The throwing affects only one arm, and it is only the pitcher's arm which gets much exercise at that. The catcher throws the ball as frequently as the pitcher, but not so strenuously. All such throwing is one-sided exercise, even though the body muscles are used to some extent. These body muscles are used more in batting, and if one is at bat frequently and does a lot of swinging, a fair amount of exercise is obtained.

On the whole, however, baseball, even when the competition is keen, cannot be called a strenuous game. During any one inning all the players on the side which is at bat are resting, except the batter and those who happen to be on the bases. On the side which is in the field, the pitcher and catcher are doing most of the work, especially if the pitcher is so good that he strikes out most of the batters. The fielders and basemen may be required to do some running and throwing, but most of the time they are merely on guard. On a regular team each man has his own position to play, so that the variety of his muscular movements is still further limited. From the health standpoint the best way to play baseball is in such games as "single-handed base," "one old cat" and the one known to boys as "movings-up," in which the players rotate in the various positions.

**Baseball, a
Constitutional
Exercise**

Baseball is essentially a constitutional exercise. It may be played mildly or strenuously as desired; but even when played strenuously it does not develop much muscle nor does it require unusual strength. Speed and endurance are the chief qualities required for a good player, and yet the game itself does not give enough practice to develop these qualities unless one is playing constantly. Consequently if one wishes

to excel at the game one will take other exercises to develop the muscles which are used the most and to build the maximum speed and endurance. A combination of sprinting and medium-distance running is very good. Developmental exercises for the arms, shoulders and calves will also be of value, and, of course, general calisthenics.

This need not deter ordinary persons from playing the game, however, as they will not be likely

to make such strenuous efforts as to produce a strain. The majority of children and adults who play ball do so merely for pleasure, and hence do not exert themselves any more than they find pleasurable. The very fact that baseball can be played mildly, by people who have had no special training and who may not be very strong, is one of the greatest points in its favor from the health standpoint. Persons who are in condition for mild exercise only can, by playing baseball, secure the advantages of the pleasure and mental stimulus that comes from the game without much danger of overexercising themselves, especially if competition is reduced to the minimum. There are many modifications of the standard game which may be employed to adapt it to the needs of the players or the limitations of the environment. No special uniform or equipment is required other than the ball and bat. When the game is to be played for its health value a diamond can be improvised on any space of suitable size, making it smaller than the standard if desired or if necessary. The players will not need gloves,



Grip for pitching a "curve" or a "drop."

Baseball
Equipment

as the ball will not be thrown with any great velocity. For these games the indoor baseball and bat are generally to be preferred. If the number of players is limited only one or two bases need be used. Given a ball and bat, almost anyone can devise a satisfactory game to fit the conditions, but the main points of the standard game are given for those who wish to play it. As interest grows and health improves one may wish to "graduate" from the free and easy game to the standard and more strenuous one.

Outdoor Baseball. Equipment.

The Playing Field (Diamond): See illustration on following page for general lay-out.

The Ball: Hard, leather-covered, 9 inches circumference, 5 ounces weight.

The Bat: A round stick of hard wood, tapered and knobbed at one end, 34 to 36 inches long.

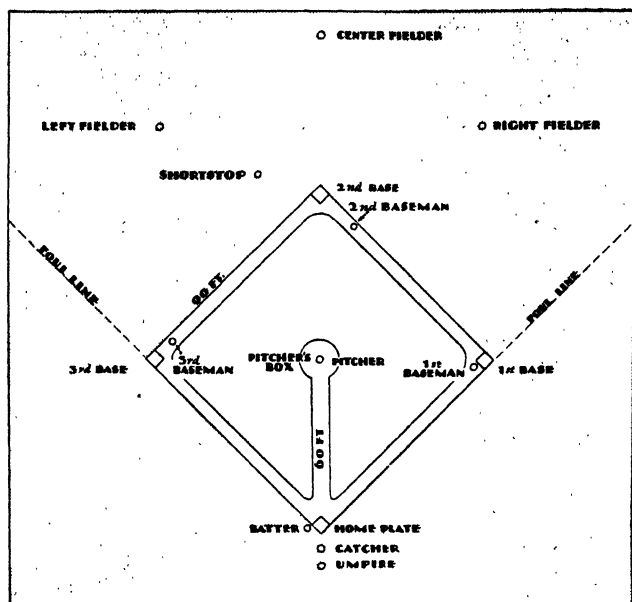
Gloves: Of various sizes and shapes according to players' positions, to protect the hands.

Wire mask and padded chest-protector for the catcher.

The Players (Nine to a team): *Pitcher*, who, attempting to get it past the *Batter*, throws the ball to the *Catcher*. *First*, *second* and *third Baseman*, who guard the bases. *Shortstop*, *left*, *right* and *center Fielders*, who guard the field.

The Game: The pitcher throws the ball to the catcher, attempting by means of speed and curves to prevent the batter from hitting it. If the ball is not hit, the catcher returns it to the pitcher and it is thrown again. The batter is allowed three tries to hit the ball, called "strikes," before he is counted "out" and must retire. If the ball crosses the home plate without the batter attempting to hit it, however, it is counted a strike. If it does not cross the plate it is counted a "ball." Four balls entitle the batter to go to first base. If the batter hits the ball into the air, and it is caught by any of the players on the opposing side before it touches the ground, the batter is out. If he hits it within fair territory and it is not caught, he can run as far around the bases as he can without being tagged with the ball, which is recovered by the fielders and thrown in to the basemen. If the batter can run completely around the diamond, continuously and all at once, it is called a "home run" and he scores one. If he reaches first

base but can go no farther with safety, he stays there until the next batter hits the ball, or until he has a chance to run to the next base without being caught and tagged with the ball. The latter is called "stealing" a base. If the ball is hit into foul territory, it is counted a strike until two



Plan of a baseball diamond showing the positions of the players on the field.

strikes have been called, after which it is not counted at all. If a foul is caught before it touches the ground, the batter is out. The duty of the basemen and fielders is to recover all batted balls as quickly as possible, so they can try to tag the batter out; also the basemen must be ready to catch a thrown ball from the pitcher or catcher in an effort to put out a base-runner. Each side is allowed three outs, whether these occur as a result of the batter striking out or of a base-runner being tagged. When the batting side has had three outs, they take the field and the other team comes to bat. When both teams have been put out it is called an "inning." The full game is played in nine innings, and in the event of a tie extra innings are played; the side scoring the most runs wins. Should weather or darkness terminate the game before the fifth inning, it is declared no contest; and should any other circumstance cause the discontinuance of the game after five innings have been played, the team with the best score at the moment of calling game is declared winner.

Indoor Baseball. Equipment.

The Playing Field (Diamond): The general plan is the

same as in the case of the outdoor field, except that it is smaller, the base-lines being only 27 feet and the distance from home-plate to the pitcher's box 23 feet. The field may be located outdoors as well as in, but is generally marked out on a gymnasium floor. The bases are not fastened into place.

The Ball: Semi-soft, leather-covered, 14 to 17 inches circumference, 8 ounce weight.

The Bat: Hard wood, about 33 inches long, $1\frac{3}{4}$ inches diameter.

The Players (Seven to Nine on a side): *Pitcher; Catcher; first, second and third Basemen; Shortstop; left, right and center Fielders.* *Shortstop and center Fielder* may be omitted.

The Game: Indoor baseball is played practically the same as the outdoor game. The chief exception is in the manner of pitching. This must be done in the style known as "under-hand," with the arm swinging parallel with the body. There are no restrictions on curving the ball. In an official game the rules in regard to strikes, fouls, and base-running vary slightly from those applying to the outdoor game, but when playing for health the rules given here for outdoor baseball may be employed. Indoor baseball is an even milder game than the outdoor variety, and is therefore especially adapted to the needs of women, children and persons not in the best of health. As a constitutional exercise, however, it may be played to advantage by anyone, and it is much used in gymnasiums, following a class drill.

**Basket-ball:
Its
Requirements**

BASKET-BALL.—This is essentially an indoor game, but it can be played out of doors, if desired, when a smooth level piece of ground is available. This is necessary, as the ball is bounced frequently and if the ground is rough it will be out of control much of the time. The game was originally designed for use in the gymnasium and was invented, in 1898, by Professor Naismith of Springfield Training School. It has now become very popular, especially in schools and colleges, though it is also played professionally. Basket-ball ranks with baseball and football in its ability to hold the public interest. It is played by both men and women and by the young and old. In common with all games it may be played mildly or strenuously, but even when the intention is to play very mildly considerable exertion is required.

Basket-ball requires strength, endurance, coordination and practice. Playing the game develops these qualities, and hence it is a good all-round exercise. It does not develop bulky muscles but it does give all the other beneficial effects of exercise. Strength is developed by the constant running, throwing, pushing and pulling. These also build endurance. The throwing of the ball, either among the players or into the basket, and the constant necessity for keeping the eye on the ball and the other players, develops coordination of eye, brain and muscle. It can readily be seen that the game cannot be played with any degree of success without considerable practice. Regular players often spend hours merely tossing the ball into the basket. This necessity for practice, however, helps to maintain interest, for all are naturally interested in their improvement.

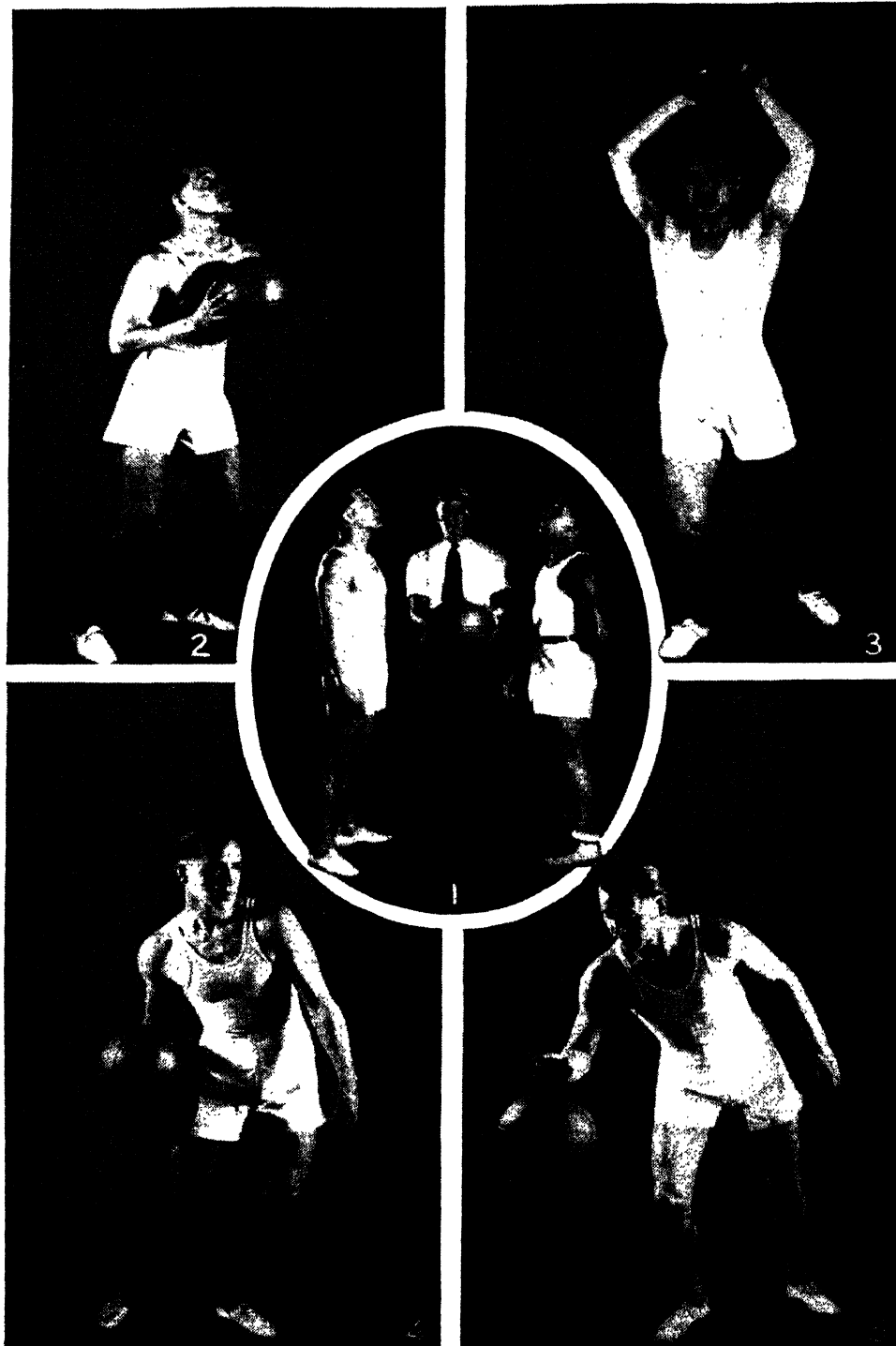
One should start playing the game gradually, as it is quite a tax on the heart and lungs owing to the frequent and rapid starts and stops required. Of course, if competition is eliminated, or is retained only in a mild form, the game will not be nearly so strenuous; but even so it is well to begin lightly. Practice in running up and down the floor, while keeping the ball bouncing, is excellent for developing both endurance and control of the ball. Practice in sprinting and jumping out of doors is also of value. Exercises for the arms and shoulders taken with chest-weights or an elastic exerciser will be helpful, as the arms are constantly in use during a game and must often be held above the head in spite of opposition from other players.

Equipment
for Basket-
ball

When playing basket-ball for its health value it is best to play out of doors, to minimize the element of competition, and to limit the frequency of the games to three a week. Of course, basket-ball should never comprise one's entire exercise regimen. It should be used merely as an addition or to give variety and secure the benefits of play. When so employed the following data will give one a sufficient idea of the rules to play successfully.

Basket-ball.—Equipment.

The Court or playing field: A rectangle of no hard and fast dimensions, but generally about 50 by 70 feet, with a goal or "basket" 18 inches in diameter placed at each end on a support about 10 feet up.



BASKET-BALL. (For description see next page.)

BASKET-BALL

1. *Starting the Game.* The referee stands ready to throw the ball in the air between the centers of the opposing teams, who stand with one arm behind the back, the other by the side, ready to jump to hit the ball towards their forwards. The hand behind the back must not assist.
2. *"Shooting" for the Basket.* This style is much used in trying for a goal from the foul line.
3. *An Overhand Throw.* Occasionally used in trying for the basket, but usually only in passing the ball to another player.
4. *An Underhand One-arm Throw.* The player draws the arm back, and throws the ball with a fling of the arm and twist of the body. This is an excellent throw for a long pass, as the ball is under good control.
5. *Dribbling.* The player desiring to work the ball towards the goal without passing it, dribbles by repeatedly hitting the ball smartly on the floor so as to carry it along with him for as long a distance as he can towards his own goal.

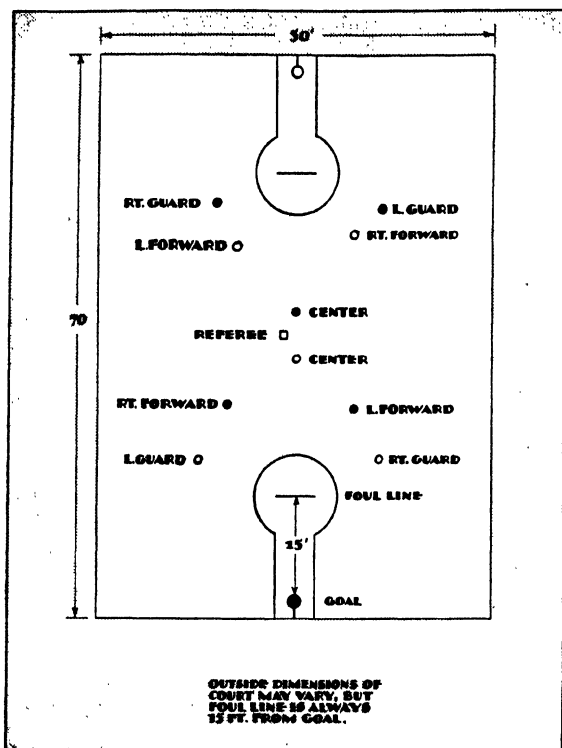


Diagram of a basket-ball court showing the positions of the different players on the opposing teams.

The Baskets:
Metal hoops, from which are suspended bags of netting, open at top and bottom, so that the ball will drop through.

The Ball:
Leather-covered with air-inflated rubber bladder, spherical shape, 9 to 10 inches in diameter, 18 to 21 ounces weight. The ball is blown up very tight, so that it bounces easily.

The Players
(Five to a team):
Center; right and left Forwards;

right and left Guards. See illustrations for placement.

Uniforms with knee-protectors may be worn if desired.

"Jumping"
Center in
Basket-Ball

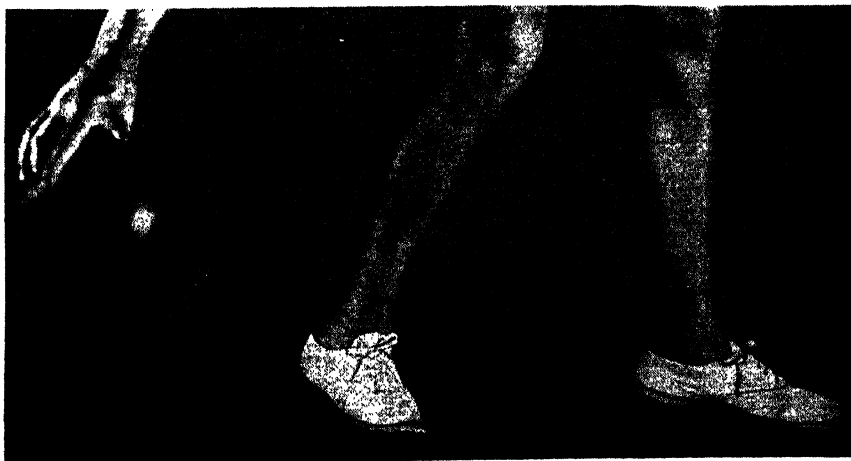
The Game.—The two centers stand facing each other in the middle of the floor with the referee between holding the ball. He tosses the ball into the air and the two centers jump and strike at the ball with one hand, attempting to bat it to one of their own forwards. The one who is quicker succeeds, and the game is on. It is the duty of the forwards to receive the ball from the center and then try to toss it through the basket which is their goal. If one of them succeeds it counts two points. The ball may be advanced only by passing (not carrying) it, or by dribbling in the manner permitted by the rules.

While the team in possession of the ball attempts to throw the ball into the basket, the opposing team tries to prevent this, and also to gain possession of the ball so that it may try for goal.

The ball usually changes hands quite rapidly during a game. Only one hand can be used in attempting to get it away from an opponent. As soon as a goal is scored the ball is returned to the referee, and the centers have to jump for it again. Failure to observe any rules of the game constitutes a foul, and fouls are most important in basket-ball, each one giving the opposing team the privilege of trying for a "free-throw" goal, which counts one point. The free throw is done from the fifteen-foot line directly in front of the basket. If the ball goes out of bounds at any time it is given to a member (usually a guard or the center) of the team opposing the one who sent it out of bounds, and he throws it to one of his own players from the spot where it passed the bounds, opposing players meanwhile trying to intercept the ball.

**Important
Basket-Ball
Rules**

The game is played in two "halves" of 20 minutes each, with a rest of 10 minutes between halves. The side having scored the most points when time is up wins. If desired, the time of the halves may be shortened to 15 minutes, and when playing primarily for health it is a good plan to play only ten minutes at a time. Then, after two halves, if the players feel like more, an additional ten minutes can be played. All the various rules may be thus modified, if desired, in order to adapt the game to the requirements of the players and the environment, though of course such a modified game would not be "official."



Bowling, showing the grip and the position of the ball in relation to floor and feet.

BICYCLING.—*See Cycling.*

BOWLING.—Bowling is an ancient game which was first played out of doors, but which is now usually played indoors on specially constructed “alleys.” Even as ordinarily played, however, the game gives some exercise. There is a little leg work and body-bending as the ball is rolled, and if the playing conditions were only improved it would make a good game for persons just taking up exercise, for patients with mild chronic diseases, or for anyone desiring a mild form of muscular activity. The mental interest and the play spirit associated with the game add to its health value. A certain amount of skill is necessary to make a reasonable score, and this helps to maintain interest.

Bowling
and Health

If one desires to excel at the game, practice is about the only thing necessary in addition to measures for improving the general health. The latter are always required for success at any game of skill, even though it may not be particularly strenuous, for unless the health is all that it should be the functioning of the eyes, nerves and muscles will not be up to normal. One must not only have good coordination at the start of the game, but must be able to maintain it. General calisthenics and dancing would be of value for improving the coordination and muscular control and for increasing agility. Outdoor walking and deep breathing would be especially indicated, since the game is played indoors. The following is an outline description of the game.

Bowling.—Equipment.

The Alley: Made of polished wood, 65 feet to 70 feet long, $3\frac{1}{2}$ feet wide, accurately leveled, and with a gutter along each side. There is an “apron” of wood (not elevated) for the player to stand upon at one end and a smaller one at the other end to accommodate the pins.

The Pins: Bottle-shaped pieces of wood, much like Indian clubs, 12 inches high. Arranged in rows 12 inches apart, four in back row, three in next, two in next and one at the front, thus forming a triangle with point facing the player.

The Balls: Hard polished wood, or a composition with like qualities which may include rubber, with small holes drilled in them for the finger and thumb so that a good grip may be obtained. Of various sizes, not over 27 inches circumference.

The Players: The game may be played individually or in teams. Each player takes regular turns at rolling the ball. There is no limit to the number who can play, but it is seldom that more than six use one alley.

The Game: The ten pins are set up according to the above described plan on designated spots, after which the player selects a ball and sends it rolling or skidding rapidly down the alley by a swing of the arm parallel to the body. Each player is allowed two balls. The number of pins he succeeds in knocking over is his score. If he knocks them all down with one ball it is called a "strike." Pins left standing are called "spares." Each player takes his turn. After ten "frames" (ten turns for each player), the score is computed and the player having the highest score wins. The pins are replaced in position and the balls returned down the gutters to the players by a boy stationed behind the pins. The game is not so easy as it sounds, as considerable skill is required to send the ball down the polished surface of the alley so as not to roll off into the gutters and yet hit the pins with just enough of a turn to knock down the maximum number. The size and weight of the balls used will depend upon individual preference and strength. A small ball, properly manipulated, may be made to knock down as many pins as a larger ball, though of course the larger ball has the better chance. But if a player has not the strength to handle a large ball properly, he will do better with a small one; also certain shots may be made better with a small ball and others with a large one.

BOXING.—In this form of athletics we have an effective means of obtaining physical fitness together with co-ordination of mind and body. Observe a boxing contest and you will have ample proof of the truth of this statement.



**Boxing: For
the Mind
and Body**

There are usually either two or three holes in a bowling ball for the insertion of the thumb and one or two fingers, so as to enable the player to get a good grip.

Particularly has this become true since modern scientific boxing has replaced the crude methods of offense and defense in vogue at earlier periods.

Boxing is a hand-to-hand conflict between individuals, modified by sporting rules, and these rules have undergone many changes. From the Greek or Roman arena, with professional pugilists pitted against each other to the death, to the amateur or professional ring of today is a far cry. The iron-studded leather cestus contrasts radically with the modern padded glove. Yet this contrast is paralleled by the change in methods of boxing attack and counter-attack that have taken place during the past few decades.

The trend of modern boxing has been toward alertness and accuracy. The modern boxer calls into play side-stepping, skilful snapping-back, ducking and slipping of the head from side-to-side as well as shifting and bobbing of the body to avoid the blows of the opponent.

These methods have replaced the toe-to-toe conflict of early boxing and the practice later developed of blocking blows by the open hand and by the forearms. The intelligent boxer finds that through agility of the entire body he can avoid the landing of his opponent's blows while keeping his hands free for counter-attacks. Thus in modern boxing defense the entire body is brought into active play more constantly than in any other form of athletics. On the offensive also the movements call into play important groups of muscles from head to foot.

The power of the boxer's attack depends chiefly upon the action of the muscles of the back. The effectiveness of nearly all blows depends upon the forward thrust of the shoulder behind the blows. This thrust is accomplished by the muscles that rotate the body. These muscles being attached to the spine, general activity of the back and sides is involved in the boxer's attack. The familiar phrase "straight-from-the-shoulder" is not quite accurate. Effective blows in boxing, and other athletic movements, are made *with* the shoulder and *from* the backbone.

Demanding such diverse activity, boxing is especially effective as an incentive to deep breathing and a means of maintaining the activity and flexibility of the back and shoulders

and entire physical framework.

The idea that boxing is brutal is very commonly held, and it cannot be denied that it is the one sport in which the rendering of an opponent unconscious is regarded as a victory. The expert and well-trained boxer, however, suffers no permanent injury from a knockout blow, and the practice of awarding a victory upon such a blow is justified by the fact that the superior strength or skill of the winner is thus established without a long gruelling contest. It is also true, in professional contests particularly, that the weaker party sometimes comes in for rough handling, apart from the final knockout, but this

is avoided when combatants are evenly matched. It is the boxer not skilful enough to avoid attack, or the one lacking in stamina, who suffers in this fashion.

Boxing contests, whether amateur or professional, are quite different from everyday boxing for exercise. In boxing for exercise and in friendly bouts the knockout and other rough handling have, of course, no place. The amateur in training or in contest may also shorten the standard three-minute round to two minutes and lengthen the ordinary resting period of one minute between rounds, as discretion may dictate.

For those taking up the sport of boxing a right start is very important. The basic principles of the sport should first be learned; then, as progress is made, attention can be given to the finer points. If too much is attempted, a great deal may have to be unlearned and a fresh start made. In learning to box one must not lose heart. There is a great deal more to the exercise than is apparent when watching two men going through with a bout, but perseverance, hard work and the determination to learn will surmount all obstacles in time.



Correct closure of the fist for boxing. Note that the fingers are turned well in and held firmly, while the thumb crosses over the first two fingers at right angles, holding them closely in the palm.

**Boxing and
Courage**

Always remember that while you are learning to box, you are also strengthening your muscles, improving your health, and taking a new lease of life. This is the reason why boxing is included in this work. No attempt is made to teach completely the theory and practice of the sport, but instead to stress the health benefit to be derived from it.

**Boxing and
the Feet**

The position of the feet in boxing should enable the combatant to advance and retreat without lost time or effort, the left foot moving forward first in attack and the right foot backward in retreat. For this reason the initial position requires the left foot to be placed in advance of the right while the left heel is lifted somewhat from the ground. The distance between the feet depends upon the boxer's height. About 20 inches is considered a fair distance for the man of average height, taller men keeping the feet further apart and smaller men standing with feet closer together.

The left shoulder is turned toward the opponent. This permits delivering of left-hand blows by a slight twist of the left shoulder and left side of the body. The hand is not drawn back before striking, as this serves as a warning to the opponent. The left hand is used chiefly in attack to discover openings in the opponent's defense, and to punish him to a point of weakening his resistance. The right hand serves to deliver the more telling blows. This is the reason why the right shoulder is drawn back and the left shoulder advanced. The most powerful blows in boxing are delivered with the entire side of the body from which the blow is delivered following through the motion of the arm. The leg on the side of the body does its part in solid blows in its follow-through by the bending of the knee and spring of the foot as the blow is delivered.

**Boxing and
the Head**

The head is turned to the left and the chin is held down near the collar-bone so that it will not be open to the opponent's blows, for the lower jaw is one of the most vulnerable spots in the entire body. Exponents of boxing have likened the safest position of the head to that of an animal butting, with the slight turn to one side characteristic of this attack of four-legged combatants. The mouth is kept closed to avoid the jarring effect upon the teeth of a blow upon the chin, or of injury to the tongue by the teeth when the lower jaw is struck.



2

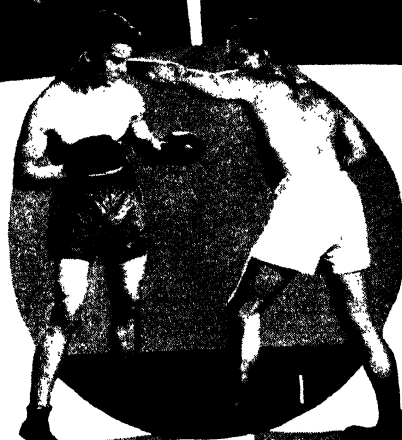


3

1. Left jab of aggressor evaded by slipping of head.

2. Snap-back to avoid aggressor's left jab.

3. Ducking under right swing to attack



body of aggressor.

4. Slipping head to left to avoid left jab from aggressor.

5. Parrying left hook of aggressor with right hand.



4



5



1. Aggressor steps inside of opponent's left guard to land right uppercut.

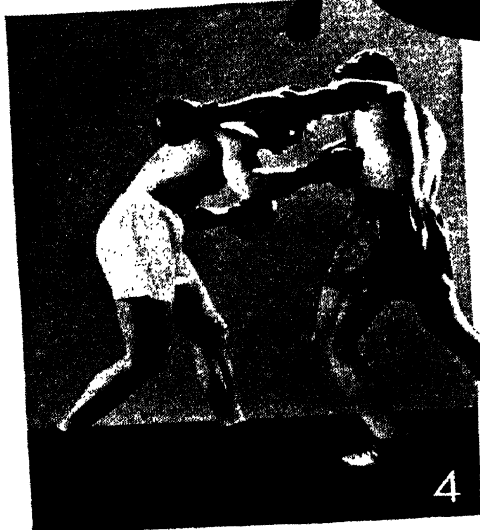
2. Aggressor steps inside of left jab to land short right hook to jaw.

3. Opponent steps inside of left hook

to land right hook to aggressor's body.

4. Attack with lefts and rights to opponent's body.

5. Man at right slips head outside of left jab and lands left hook on opponent's chin.



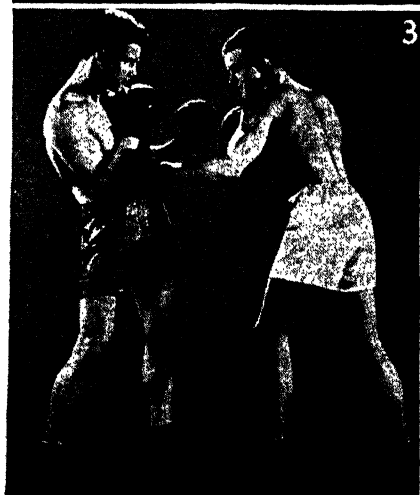
The hands must be tightly clenched at the time of delivering a blow. To strike with open hand is to risk injury to the bones of the hand. But the fists should be somewhat relaxed when they are not being used for striking, as this is less exhausting.

The hands are thrust well into the gloves so that the finger tips enter the glove-tips as closely as possible. The fingers are then closed so that the first two fingers in particular fit tightly into the palm. Outside of these two fingers, and over the middle joint, is brought the first joint of the thumb. This holds the first and second fingers compactly. It is the large knuckles that join the fingers to the hand that take the impact of the blow.

In learning to box two conditions which it is most im-



Boxing and
the Hands



CLINCHING AND BLOCKING IN BOXING

1. In a clinch, the object is to avoid blows by control of the forearms. The hands are held open and must not clutch.
2. Faulty blocking may result in one's own hands being driven with injury to the jaw or body by opponent.
3. Blows to the body are most effectively blocked by the forearms and elbows, without engaging the gloves in blocking.

portant to overcome are timidity and fear; timidity denotes a lack of initiative, and fear of one's opponent denotes a lack of confidence. Until these two faults are overcome one will never become a real boxer. Of course, it is quite natural for a beginner to exercise a certain amount of caution, especially when being opposed by a seasoned boxer, but in most cases, confidence will grow as skill increases.

Another important thing to remember is that a boxer must never lose his temper; should this occur he will be unable to concentrate and use his mind properly, and this will invite defeat in every instance.

It is also important for beginners to learn how to conserve their strength. By relaxation a boxer keeps from tiring and will be able to continue the bout much longer than would otherwise be possible. Except when delivering a blow, when he should stiffen up and put into it all there is in him, his body should be supple, not tense or stiff.

**Energy
Conservation
in Boxing**

And at the same time that he is conserving his own strength, he should, by his tactics, try to tire out his opponent. There are many ways to do this. One of the commonest is to keep the opponent guessing as to the next move. This trick may be accomplished by shifting, feinting, giving the impression that a certain blow is coming, without really attempting the blow. Another way is to make the opponent take the offensive, giving way before his rushes, sidestepping and constantly changing position without allowing him to get properly "set" at any time. Still another is to lean heavily upon the opponent in clinches, or to allow him to lean forward and then suddenly to back away, causing him to plunge forward. In attempting to keep from falling he is apt to expend considerable energy and strength.

**Ring
Requirements
in Boxing**

The Ring.—For regular boxing bouts the ring is on a platform and consists of an area 16 to 24 feet square, marked off by ropes and posts arranged as set forth in the rules. The floor should have a properly constructed canvas covering, and there are two stools for the contestants to sit upon during intermissions. Two pails of water, bottles, sponges and towels are also provided, and powdered resin, upon which the soles of the shoes may be rubbed to prevent slipping, is sprinkled in each contestant's corner. A gong is required to signal the

start and the finish of each round, and a whistle to be blown 10 seconds before the start of each round as a signal to get ready, and to notify the contestants' handlers to leave the ring.

Fouls.—The rules of the Amateur Athletic Union of the United States provide that: "The referee may disqualify a competitor who is boxing unfairly, by kicking, gouging, or hitting with the open glove, hitting with the inside or butt of the hand, the wrist or elbow, hitting or catching hold below the waist, hitting when down (one knee and one hand or both knees on the floor), striking an opponent on the back of the neck or on the spine or over the kidneys, holding with one hand and striking, butting with the head or shoulders, hitting when in clinches, wrestling or roughing at the ropes, using offensive or scurrilous language, or not obeying the orders of the referee." In professional boxing a protective cup must cover the genitals so that a foul blow landing below the waist will not disable the offended opponent. It is no longer the practice in professional boxing-matches to permit a championship to change hands as the result of a foul.

Costume.—Consists usually of a pair of trunks similar to running trunks, socks, a pair of soft leather shoes, the boxing gloves, and a metal cup fastened about the waist and crotch to protect the genitals.

What Persons May Box With Safety?—There are not many conditions which would be called contraindications to boxing as an exercise or as a sport. The principal ones are *disease of the heart, disease of the lungs, and high blood-pressure*. The exertion of boxing would tend to raise the blood-pressure still higher and might result in injury to the boxer.

CANOEING.—Canoeing is one of the most enjoyable and worth-while of sports, and it is unfortunate that more people are not within convenient distance of water suitable for the purpose. An expert can use a canoe in any kind of water, including river rapids and ocean breakers, but the ordinary person will need smooth water until skill in paddling is developed. Later difficult water conditions, compelling the canoeist to use his skill in order to make progress and avoid an unwanted bath, may add greatly to the enjoyment of this sport.

Places for
Canoeing

A canoe is not dangerous when properly managed. After

this initiation one can venture farther and farther afield. It is always well, however, to know how to swim, and one of the benefits of canoeing is that it encourages one to acquire this valuable accomplishment. The canoe is so light and easily managed that a child can handle it. It draws very little water and can be used on the shallowest streams. If one is not in a particular hurry to get somewhere, very little exertion is required to paddle. So this sport may be enjoyed by young and old, the weak and the strong. For the latter, added interest may be secured from racing and the various contests which aim at ducking the occupants.

The benefits of canoeing are many—the fresh air and sunlight, the exercise, the deep breathing, the mental and to a considerable extent the physical relaxation, the toughening

Benefits of
Canoeing



PHOTOGRAPH INTERNATIONAL NEWSREEL

Canoeing is one of the most fascinating and health-giving of pastimes. It supplies fine exercise and refreshing recreation for either sex, and for young or old.

effect of exposure to wind and weather, the courage and the self-reliance developed, etc. Most people, when canoeing, wear the minimum of clothing, so that the skin as well as the lungs gets the benefit of the air and sunlight. The bathing-suit is a very popular costume for canoeing, particularly for those who can also swim.

The two sports usually go hand in hand. The exercise secured from paddling may seem to be mostly for the arms and shoulders, but anyone who has done much paddling knows that the back and abdominal muscles are also used to a large extent. The legs are rather neglected, but most people get a reasonable amount of exercise for their legs, even if they do not indulge in sports. One should practice paddling on both sides of the canoe and with the double paddle, so as to secure balanced exercise. When one has become expert at it, it is possible to paddle all day long without great fatigue; yet the amount of exercise obtained will be considerable. It is much like walking—an exercise of endurance rather than strength. Yet real strength may be developed by fast paddling and by fighting rough water. A really strenuous and exhilarating exercise is canoeing in the ocean breakers. One must be constantly on the alert, able to paddle powerfully and quickly on either side of the canoe, and able to balance perfectly. One should not attempt this, however, unless able to swim well. Such exercise naturally induces deep breathing. It also teaches coordination of mind and muscle and develops confidence in one's ability to look after oneself.

**Kinds of
Paddling in
Canoeing**

As a contrast to this form of canoeing we have the lazy paddling along a quiet winding creek. This affords some exercise, but is especially good for relaxation. It takes the tension out of mind and muscle and chases the blues. As a recreation after a hard week in the office it is excellent, and after a hard week of physical labor it is even better. Getting close to Nature tends to keep one in balance and promotes a desire to live naturally. If we could all indulge in a little such canoeing every day, life would be easier and we would live longer.

Canoes vary in size and shape, but practically all are made with a wooden frame and canvas covering, which is painted and decorated. This gives a light, yet strong construction, very buoyant in the water. Some canoes are equipped with air-chambers, so that they are unsinkable. This is good but not necessary, as most people who use a canoe very much soon learn how to swim and how to right the craft when it capsizes. The Indians, who are the real masters of the canoe, think no more of capsizing than they do of taking an ordinary bath.

They have a method of righting the canoe and jumping in themselves in a single motion. This is done by seizing the canoe by the gunwale and giving a sudden, peculiar and powerful jerk, at the same time kicking with the legs to force the body out of the water.

Either the single or the double paddle may be used. The latter gives the most balanced exercise, but the former is best for ease of control and all-round paddling. When using the single paddle the stroke should be started a little out from the canoe and tending inward, and should be directed somewhat outward at its conclusion. This will keep the canoe going straight forward in spite of paddling all on one side. However, it is always best to practice paddling on both sides. Steering is done by modifying the stroke, or occasionally, when it is necessary to make a quick turn, by using the paddle as a rudder. The canoe is very responsive, and it is surprising how much speed and control may be developed by the experienced paddler. The position assumed when paddling will depend upon the individual and the type of canoe, but it should always be such as will be comfortable, with no danger of cramping, and at the same time allow full play for the body and arms. One should especially avoid sitting too high, as this requires excessive bending of the back and makes the canoe top-heavy.

COASTING.—Most people consider coasting, or tobogganing, a sport of childhood, but those fortunate individuals who can go to the famous winter resorts of St. Moritz, Lake Placid and Montreal know that the “grown-ups” may enjoy sliding down a snow-covered hill on a sled just as much as the youngsters. It is a pity that so many adults allow dignity to interfere with their health and pleasure. They are willing to toboggan at a fashionable resort where everybody else is doing it, but never think of sliding down the nearest hill with their children. Coasting, or rather coasting with the hill-climbing combined with it, is so valuable for the health that we ought to have more of it, and it is discussed here in the hope of arousing some enthusiasm for the sport. Some of us have ridden on toboggans which, at the bottom of the slide, would round an embankment at the rate of 60 miles an hour. No words can adequately express the glorious exhilaration of such an experience.

We live indoors too much the year round, but especially in the winter. Any sport, therefore, that takes us out of doors at this season is going to be beneficial. The crisp, cold air of winter is extremely invigorating and does much to prevent colds and build resistance to all diseases. Deep breathing is instinctive while coasting, not only because of the necessary hill-climbing, but because of the exhilaration of the descent. The alternate coasting and hill-climbing give alternate periods of exercise and rest, so that one can keep up the sport for a long time without undue fatigue. For the best health results the hills selected should not be very long or steep. Clothing should be warm but not bulky. Men and women should dress practically alike, in cap, sweater, knickers and wool hose or leggings.

Coasting: For
Health and
Sport

Regular coasting is a sure cure for loss of appetite. It will also improve the complexion and induce sound sleep. Those who live where there are hills and can take advantage of this winter sport should consider themselves fortunate and should not neglect their opportunities.

CRICKET.—Cricket is one of the most popular games in England, but it is also played in France and the United States, as well as in all the British possessions. Being thus of nearly world-wide interest it is of great importance from the health standpoint. Cricket is primarily a ball game and bears some resemblance to baseball. Those ancient implements, the ball and bat, are the chief items of equipment. The game is played by young and old, and it is said that in order to become a good player it is necessary to start early in life. It is very popular in the schools and is also played by professional teams. In the British Empire cricket commands as much public interest as does baseball in America.

Cricket: Its
Health Value

The health value of cricket is about the same as baseball—depending mainly upon fresh air, running and mental interest. Outside of the running the amount of exercise secured from cricket is not great save for the work involved in “bowling,” this corresponding somewhat to the work of pitching in the game of baseball. In close games, the players may perform all their movements more vigorously and the pace at which the game is played will be faster, so that more exercise is secured. In general, however, the game would be classed as mild con-

stitutional exercise. As such it has its place, but it should, of course, be combined with other exercise.

One who wishes to excel at the game must depend chiefly upon practice in sprinting, so that he can change places at the wickets with the greatest possible speed, and upon practice in throwing and hitting the ball to develop coordination of eye and muscle. Endurance and agility are the chief requirements; hence due attention should be given to all general health-building measures. Even in the mildest games the team which is in the best condition will usually win. This is especially true of cricket, since it takes from one to three days to play a match game and the endurance of the players is a most important factor in a contest of such duration.

Cricket.—Equipment.

Equipment
for Cricket

The Field: A fairly smooth and level piece of ground covered with closely mown grass, in the center of which are the wickets, placed 22 yards apart.

The Wickets: Consist of three stumps (round sticks like broomsticks, 27 inches out of the ground), with two bails (spool-like pieces of wood) each 4 inches long, lying in grooves along their tops.

The Ball: Hard, leather-covered, 9 inches circumference, 5½ ounces weight.

The Bat: Wooden, 38 inches long, with handle and broad blade 4½ inches wide.

The Players (Eleven to a team); *Bowler, Wicket-keeper, Long-stop, Short-stop, Point, Cover-point, Long-slip, Long-on, Long-off, Mid-wicket-on, Leg.* The player on the other team who is guarding the wicket with his bat is known as the *Striker*.

Gloves and shin-guards are usually worn.

The Game.—When all the players are in position the bowler throws the ball in an effort to knock down the wicket which is being guarded by the striker. The ball is not thrown direct, but must reach the striker on first bounce. The striker hits the ball, not only to keep it from knocking down his wicket but to give him an opportunity to make a “run.” If he can knock the ball far enough to permit him to change places with his fellow striker before it is returned by the fielders, he makes a “run” and counts one. He can make up to six if he has time.

If he fails to hit the ball and it knocks down his wicket, or if it is knocked down while he is trying to make a run, he is "out" and another player from his team must take his place. Any balls which get past the striker are recovered by the wicket-keeper and returned to the bowler. After the bowler has thrown six balls from one wicket the whole field except the strikers and the bowler shift places, so that the next six balls can be thrown from the other wicket. During this time the man who was long-stop becomes bowler and the former bowler becomes long-stop. The other striker also has a chance to bat. The period during which a team is "in" is called an "innings." After all the players of the team have been put "out" the other side has its innings. When both sides have had two innings the game is ended, and the side having scored the most runs wins. One can play a leisurely game of cricket without any particular skill, but if one expects to succeed in competition practice in bowling and striking is important.

CROQUET.—Croquet is a lawn game that was popular in our grandmothers' time, but which has declined considerably in these days of high-speed living. It is related to the old English game of pall-mall, from which the famous street takes its name. The preferred form of the game at present is the scientific croquet known as roque, and there are clubs and grounds located in many of the larger cities. See under the heading *Roque* for description. Croquet is sometimes played with rules very similar to those of roque, but the simplified form is more generally used.

Croquet as an
Exercise

From the health standpoint the value of croquet is limited chiefly to the benefit derived from the fresh air and the mental interest of the game. The exertion required is very slight. There is not even much walking. There is, however, considerable bending and this is of some value. While there are many games more useful than croquet, it is far from valueless and is certainly much to be preferred to cards and similar games. The fresh air alone is worth while. For weak persons, sanitarium patients and old people it has a definite value, since it gives them an interest in using their muscles, even though slightly, and takes their minds off themselves.

Special skill is not necessary to play croquet, but when one has developed skill it makes the game more interesting, as

quite complicated shots can be made, much the same as in billiards. This incentive to the development of skill leads to regular playing, so that the maximum amount of health benefit is secured. Proficiency depends upon coordination of eye and muscle so that accurate shots can be made. The ability to think and plan ahead is also helpful. These attributes come mostly from practice. Additional exercise to improve the general condition should be taken.

Croquet.—Equipment.

Equipment
for Croquet

The Court: A regular gravel court is seldom used for ordinary croquet. Any smooth stretch of lawn is selected, and the wickets are inserted at any convenient intervals as long as the proper arrangement is maintained. Boundary-lines can be formed if desired by stretching white cords on pegs. Usual size 60 by 30 feet.

The Mallets: Of wood, decorated, no standard size, but head usually 6 to 9 inches in length.

The Balls: Of wood, painted red, white, blue and black, usually $3\frac{5}{8}$ inches diameter.

The Stakes: Round decorated sticks of wood, $1\frac{1}{4}$ inches diameter and about 2 feet long. For an official game a short stake which extends only $1\frac{1}{2}$ inches out of the ground is used.

The Wickets: Arches of heavy wire large enough for the balls to pass through.

The Players.—Croquet is played individually or with partners. For an official game only two players take part, each using two balls, the same as in roque. For an ordinary game four can play, or even eight, in which case only one ball per person is used. Then the balls must all be decorated differently.

The Game.—Croquet is usually played quite simply without much regard for the official rules. If one desires to play the official game the rules given for roque may be employed. An easy method of playing the game is as follows: One player takes the red and blue balls and the other the black and white. Each player takes his turn and starting at one stake endeavors to drive his balls through all the wickets in a prescribed direction to the other stake and back again. The one who finishes first wins. In making side or corner wickets the

playing ball must pass through them towards the center and not away from it. Clips or markers for the wickets may or may not be used as desired. When a number of players are engaged, it is well to use the markers, in order that there may be no confusion as to which is the next wicket to be played. Each player has his own marker and places it on the wicket for which he is playing. After having passed that wicket he moves the marker to the next one. After the balls have been started from the stake each player continues his turn as long as he makes a point, or roquets another ball. A point is made by knocking one's ball through a wicket. Striking another ball with one's own ball is a "roquet." Each player may roquet any ball on the ground once only before making a point. After roqueting a ball one must play from the ball by means of a "croquet." This means to place the two balls together and then play them in such a way as to retard one's opponent's ball, or to advance both balls if they are on the same side. When croqueting from opponent's ball the foot is placed on one's own ball to hold it stationary and it is then struck in such a way as to drive the other ball as far away from its objective as possible. This putting the foot on the ball is not allowed in the official rules, but is commonly employed in the ordinary game. A player is allowed one more stroke after taking a croquet, so that if the latter placed his ball near a wicket he can drive it through. If he held his ball stationary for the croquet he can make another roquet, or can drive his ball near or through a wicket. If he makes a wicket he can again roquet and croquet on all balls. It will thus be seen that it is important for a player to leave his balls at the end of his play in such a position that they will be of the least possible advantage to his opponent; also in croqueting his opponent's balls to drive them into difficult positions. In order to finish his game a player must hit the final stake with both his balls on successive strokes. If he only hits the stake with one ball, both balls must remain in play until they can be driven out with successive strokes.

**Diversified
Rules in
Croquet**

The official English game is somewhat different from the American game, especially as regards the placing of the wickets, but the general object and the health advantages are the same.

**Curling: Its
Value as an
Exercise**

CURLING.—Curling is an ancient Scottish game which is played on the ice, and as a health-builder it has considerable to recommend it. It keeps the player out of doors in weather which would otherwise keep him inside. The crisp cold air, the exercise, the deep breathing and the keen mental interest all combine to stimulate every function in the body. The appetite and the circulation are especially improved and elimination is also increased. More exercise is secured from the game than one would think to watch it, as the "stones" employed weigh from 32 to 44 pounds each. The man who has charge of sweeping the ice also gets a lot of exercise. Curling may be recommended as good constitutional exercise for those who are not afraid of cold weather. Its use at present is confined to cold countries, as there is not enough general interest in it to warrant the construction of rinks of artificial ice. Too many people love their firesides on a cold day.

About the only thing that will make one proficient at the game is practice. Even then the hazards of the ice make luck a considerable factor. Probably this is another reason for the mental interest of curling. Games of chance always seem to be particularly fascinating, since anyone may win. Of course the man with good coordination, good resistance to the cold and good general health will always make the better player.

Curling.—Equipment.

The Rink: A stretch of smooth ice 32 to 42 yards long and 10 yards wide, with a hole or mark at each end called the "tee."

The Stones: Hemispherical polished stones 36 inches circumference, 32 to 44 pounds weight with iron or wooden handles on top.

The Players.—The game may be played individually, each man for himself, or in teams of eight to sixteen. When eight are playing each man uses two stones, when sixteen are playing only one stone each is allowed.

The Game.—The players slide the stones over the ice from one mark to the other, the object being to lay them as near the tee as possible. When playing in teams one player may use his stone to knock an opponent's stone away from the tee in order that a player on his own side may have a better chance, or he may try to so place his stone as to protect the stone of

one of his team-mates which has come very near to the mark. The four stones nearest the tee score. Stones which go out of bounds, or do not pass a certain mark known as the "hog score," do not count. The exact method of scoring varies in different places, so that one can make up one's own method or be guided by the customs of those with whom one is playing.

CYCLING.—The term cycling would include bicycling, motorcycling and tricycling. However, since the tricycle is so little used now, even by children, this discussion will be limited to bicycling and motorcycling.

Bicycling.—When the modern bicycle was introduced, not so many years ago, it became all the rage. The roads were thick with wheels. Now you see hardly any; yet taking the country as a whole the bicycle still holds an important place. As a racing sport bicycling has advanced to quite a prominent position, and many of the professional riders are as well-known as the professional boxers or baseball players. However, most of the bicycle-riding nowadays is done chiefly for transportation purposes—children ride to and from school, boys use the bicycle to deliver papers, and men use it to some extent in getting to their work and back again. There is little of the riding for pleasure and recreation that we saw so much of a few years ago. Most of the recreational riding is now done on motorcycles. This is to be regretted, for while the bicycle does not provide an ideal form of exercise, it is better than the motorcycle.

Bicycling as
a Recreation

Bicycle-riding, being done out of doors, has all the advantages of fresh air, sunlight and change of scenery. This alone would be enough to recommend it. In addition it supplies a fair degree of exercise. This involves the legs chiefly, but the abdominal muscles are used to some extent, especially in pedaling up a hill, and the arms get some exercise in gripping the handle-bars, guiding the wheel and carrying it over rough places. A bicycle trip covering a good stretch of territory of an uneven nature will afford a surprising amount of general exercise. It is constitutional in character, of course, and does not build much muscle, but it will increase endurance and build vitality. Such riding trips also have a genuine mental attraction and tend to interest one in other outdoor athletic activities.

**The Construc-
tion of the
Bicycle**

Most people are familiar with the construction of the bicycle. It consists of a metal frame with two rubber-tired wheels in line, the rear one of which is driven by a chain from a sprocket to which foot-pedals are attached, while the front one serves as steering gear, being manipulated from handle-bars placed at the top of the frame. There is a seat set on springs above the rear wheel. The modern wheels are equipped with brakes. It is not well to adjust the handle-bars too low, as it causes compression of the abdomen and chest. They should be high enough to allow a reasonably erect position of the back, so that the chest may be free for deep breathing. The size of the wheels and the gear ratio of the sprocket is a matter of individual preference, but should depend somewhat on the rider's height. Learning to ride a bicycle is merely a matter of a little practice with plenty of confidence. Balance is maintained largely by momentum. If excessive speed is avoided there should never be any danger of accidents. There are no particular advantages to speed riding. It calls for and builds somewhat more strength and endurance, but owing to the position assumed it cannot be highly recommended. There are better sports from the health standpoint. Racing always involves some element of danger. Properly employed, bicycling may be used to advantage, but like all other things it may prove harmful when carried to excess, as in the matter of speed.

**Motorcycling
and Health**

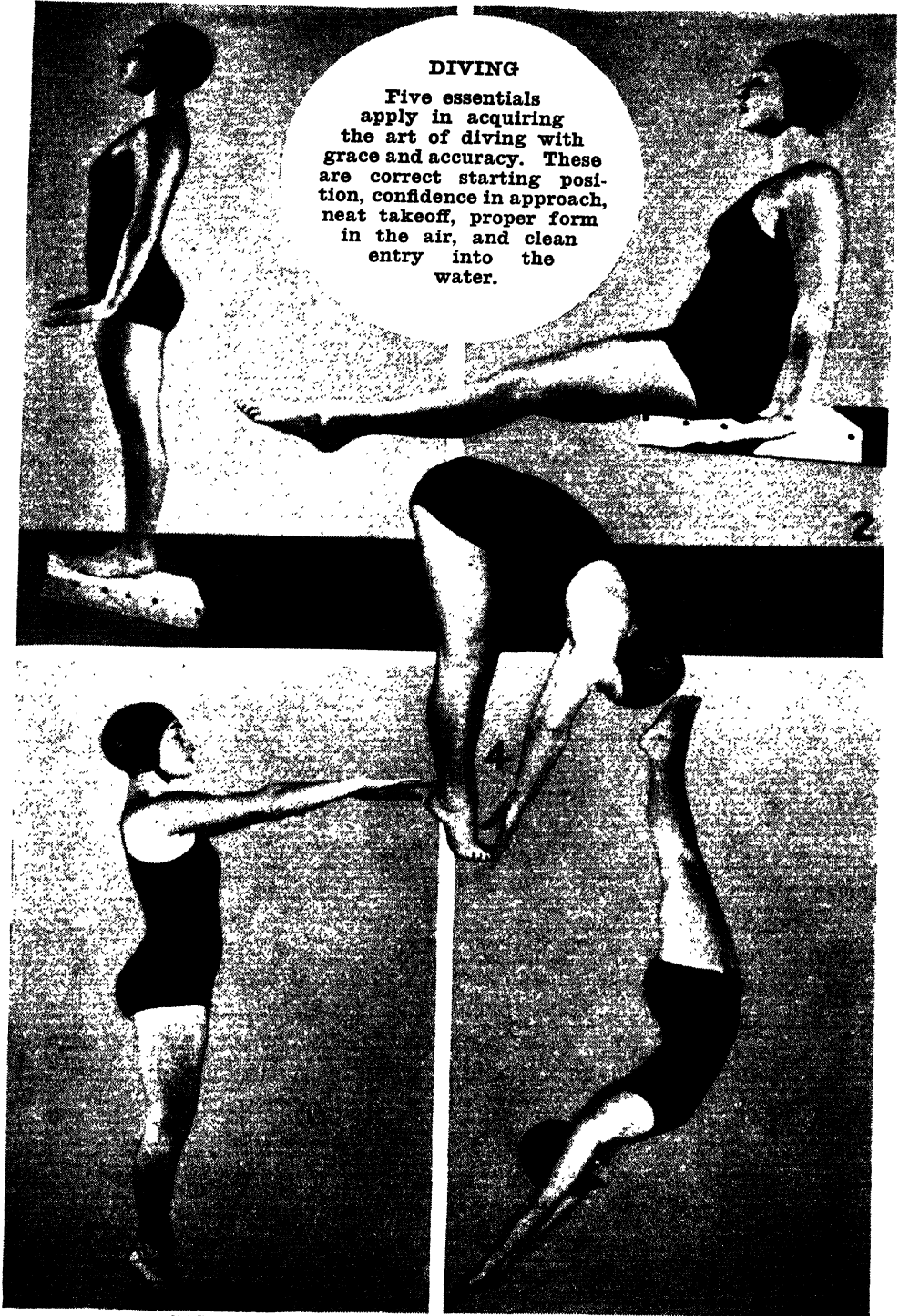
Motorcycling.—Motorcycling in itself has little to recommend it from the health standpoint, but because it leads to a greater indulgence in other sports it has its place. It is an outdoor sport and is often combined with camping. Many use the motorcycle to take them to and from a bathing beach. The real place of the motorcycle, however, is in transportation. For purposes of sport it is interesting but gives no exercise, and the benefit of being out of doors is somewhat reduced by the gases from the exhaust. The question often arises as to whether motorcycling is injurious to the kidneys or other parts of the body, because of the jarring. It is doubtful if there is any harmful effect from this cause, but if one is looking for a sport to benefit the health there are better ones than this.

DISCUS-THROWING.—See *Weight-throwing*.

DIVING.—Diving and swimming might be thought to be inseparable, but many people swim who do not dive and quite

DIVING

Five essentials apply in acquiring the art of diving with grace and accuracy. These are correct starting position, confidence in approach, neat takeoff, proper form in the air, and clean entry into the water.



CORRECT FORM IN DIVING. (See next page.)

DIVING. (See illustrations on preceding page.)

1. Ready to dive, especially the sitting dive shown in 2. For the ordinary dive the hands would point downward.
2. Second position of the sitting dive, following the initial spring upward and drop to the board. The palms are flat on the board, the knees stiff. As the spring of the board again throws the body upward, the diver pushes off with the hands, so as to drop clear.
3. Position for the back dive. The diver stands almost on the edge of the board and springs backward as well as upward, in order to escape hitting the board with the head when coming down.
4. The jackknife dive position, which is assumed by the diver immediately after leaving the board. The legs are raised to a straight line with the body before entering the water.
5. The diver's position just before entering the water. The legs are almost perpendicular and held close together. The body should be straightened somewhat and head lowered for more perfect form.

a few dive who swim very little. One often sees men and women dive into the water, swim just enough to get out, and dive again. They perhaps swim half a dozen strokes for each dive. There is a great difference between the effects of diving and of swimming, so they are considered separately.

**Advantages
in Diving**

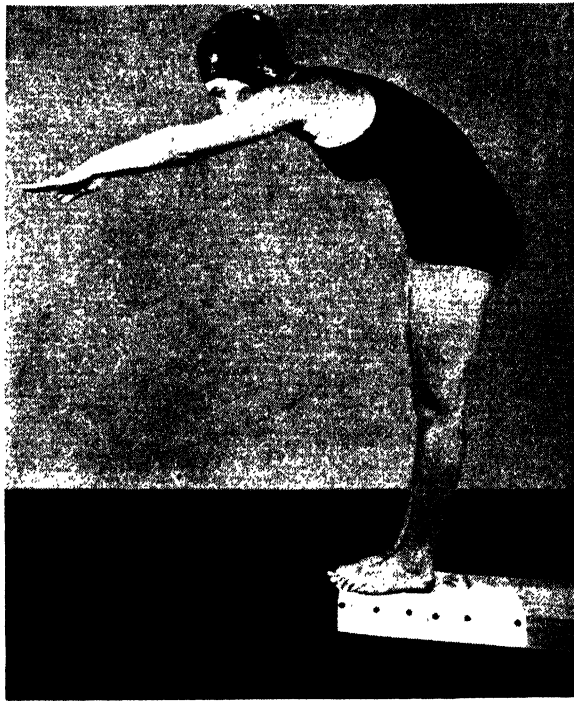
Diving consists in precipitating oneself into the water headfirst. One can jump into the water feet first; but this, strictly speaking, is not a dive. Diving requires muscular coordination and control rather than strength or endurance. It is a matter of skill, and "form" means much. In a diving contest points are awarded in accordance with the perfection with which the various movements in the different dives are performed. It is thus quite different from swimming, where racing is the primary factor. While diving is not as valuable as swimming, it has a number of points to recommend it.

It combines the advantages of fresh air, sunlight, deep breathing and cold bathing, and these are considerable. Its chief lack is in the matter of exercise. The legs are used in making the jump, and often in running before the jump; but in a plain dive the rest of the body is rather neglected. In the fancy dives the abdominal and back muscles are used to a considerable extent, but the arms would be neglected if it were not for the necessary swimming in coming to the surface and returning to the shore. Since this combination is inevitable, fancy diving may be said to be all-round exercise of a mild sort. The health will certainly be benefited by regular indul-

gence in diving, but if one desires the maximum of benefit swimming must be combined with it. See *Swimming*.

There are four kinds of diving: ordinary diving, high diving, fancy diving and diving for distance. Ordinary diving is done from a spring-board, as a rule, but any support elevated 3 feet or so above the water will serve. The advantage of the spring-board is that it assists one in getting the legs up.

A spring-board should be carefully and strongly made, so that there will be no danger of its breaking. Care must also be taken to avoid splinters, and one end should be wrapped with cloth to minimize the danger of slipping when it becomes wet. High diving is done from a platform 10 feet or more above the water. Usually there are several platforms at various heights. A spring-board is seldom used for high diving and never for the higher dives, as no additional height is necessary. The diver merely falls forward. Fancy diving is done either from the spring-board or the platforms, depending on the type of dive; but most of it is done from a board. There is a great variety of fancy dives and each one requires considerable practice so that keen interest is developed. Diving for distance may be done from any support, as the dive itself is not a fancy one. This is only a minor phase of diving.



DIVING

Getting ready for the racing plunge. The distance to the water and a little under it is gauged. Then the diver springs forward rather than upward, so that the body enters the water on a slant, as this is a shallow dive and there must be no lost motion.

Kinds of
Diving

**Dangers in
Diving**

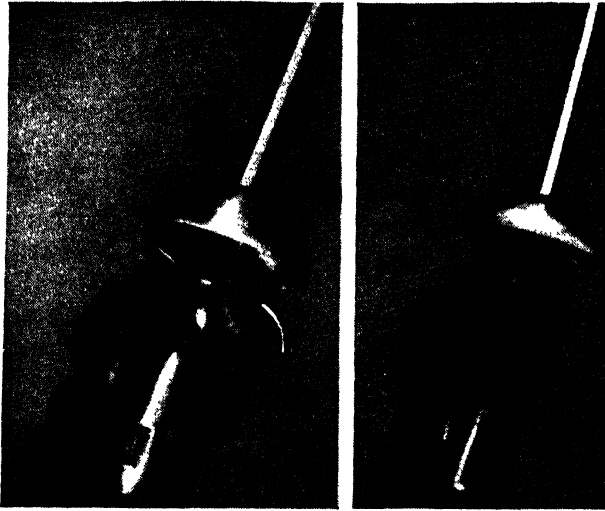
One should not attempt to do much diving unless in fairly good health. There is too much shock associated with it. In high and fancy diving there is also an element of danger, for if one does not perform the movements correctly one may land in the water in such a way as to receive a severe blow. Water may seem very soft, but when struck in the wrong way from a height of ten feet or more it will be found surprisingly hard. It is always important to enter the water in as nearly a perpendicular position as possible in order to present a minimum of body surface to its resistance. Since the dive is performed in an upside-down position it has a powerful influence on the circulation. The blood tends to run to the head until the body strikes the cold water when the shock drives it back toward the heart and the larger internal blood-vessels. This is very stimulating and has its advantages for a normal person. The frequent reversal of the ordinary right-side-up position helps to prevent prolapsus, the alternating of the light air pressure with the heavier pressure of the water acts as a massage, and the deep breathing and short periods of holding the breath help to develop the lung muscles. Since diving is always performed in either an abbreviated bathing-suit or with no clothing at all, it gives one the advantage of an air-and-sun bath, though the latter may be missed if diving in a pool. All pools should be outside, or else covered with a special glass roof which will permit the entrance of all the rays of the sun. Diving has the further advantage of making one acquainted with one's body. It is surprising how little control people have over their muscles. Most of them are very awkward if they are called upon to perform any movements a little out of the ordinary. Many of their muscles are almost total strangers to them, and they have to learn to use them as a child learns to walk. Diving requires one to develop control over all the muscles in order that the body may be turned in the air. This develops grace and symmetry. This is probably the reason that women make the best divers, and why more women than men enter this branch of athletics.

**Helpful
Points in
Diving**

In practicing diving there are several important points to remember. First, examine the water, especially if it is strange water, to see that it is deep enough and that there are no rocks, submerged trees or other obstacles which one might strike.

Second, take your time and make your dive as perfect as possible, so as to avoid accidents. Third, open your eyes under water so that you can see where you are going. Fourth, remember that the hands and head determine the direction which the body will take after it enters the water. If one wishes to go deep the head should be kept down and the hands pointing down. If a shallow dive is desired, throw the head back after entering the water and point the hands upward. The hands should be held above the head so as to soften the impact from the water, and the palms should be kept toward the front with thumbs together, so as to present a broad surface to the water. In this position the hands make a much more efficient "rudder." In order to make a good-looking dive, the legs should be kept straight and together and should be thrown well upward so as to make the body almost straight. In practicing a new dive it is well, at first, to protect the body by tying a bandage about the abdomen. For advanced and fancy diving it is always well to have personal supervision, for it is easiest to learn by imitation. Practice periods should be short at first, and one should never do so much as to produce marked fatigue.

FENCING.—Sword play of some kind has been practiced almost since the dawn of recorded history, the weapons and the methods varying among different peoples and at different times. The story of the development of fencing is very interesting, but does not concern us here. Fencing as practiced at present is purely a form of athletics and depends more upon skill than upon strength and endurance, though the latter qualities are also important. The weapon used is known as a foil. It is quadrangular in shape, very light, and has a pointed end shielded with a button. Offense is purely thrusting, the foil having no cutting edge. There is a form of fencing which employs the broadsword with a cutting edge, but it is not used much except in very largest of military colleges. In practicing foil play, masks, gloves, jacket and sometimes padded chest-protectors are worn. Bouts are limited as to time, and points are awarded on form as well as on "touches." When a fencer is touched, the rules and etiquette of the sport require him to call out the fact immediately. Fencing consists of a series of thrusts and parries, the parries being



At the left is shown modern cross-piece which automatically keeps forefinger and thumb in the proper position in fencing. The right hand photo shows the older form of hilt requiring the fencer to maintain proper grip of his weapon by skilled use of forefinger and thumb.

Essentials of Fencing

the other fingers loosening and tightening their grip as needed. The side of the body is kept turned toward opponent in order to offer as small a target as possible. It is important always to maintain balance. A thrust so violent as to throw one off balance always leaves one open to the opponent's counter-thrust. The mind should be kept strictly on the business in hand, as the slightest wavering of the attention may mean defeat. The thrusts and parries follow each other so rapidly that alertness is very necessary. Of course, beginners will be slower, and this is well, for each thrust and parry should be perfectly learned before taking up new ones or before attempting to develop speed. All the simpler movements should be well mastered before ever one engages in a contest. Fencing requires perfect coordination and this means practice, patience and self-control.

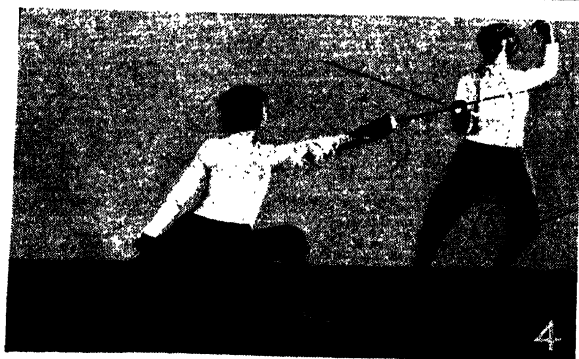
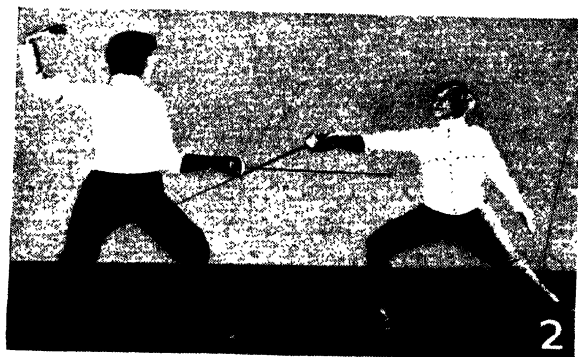
Fencing is a health-builder in many ways. It is excellent constitutional exercise. The various movements call for the use of all the muscles in the body. It may seem that the right arm gets most of the exercise, but after one has fenced awhile one discovers that the left arm is used almost as much (except the forearm), and that there is much body-bending and twisting and an abundance of foot work. A person who has been

made with the heavier end of the sword, which is nearest the hilt. The point should be kept toward one's opponent at all times, the parry being made mostly by shifting the hilt. The foil is directed with the thumb and forefinger,

fencing for any length of time always has a symmetrical development and graceful carriage. The latter is the result, not only of the position assumed when fencing, but of the marked muscular coordination developed. All the muscles are brought so thoroughly under the control of the mind that they respond instantly. Fencing also improves the vision, because it gives the eyes so much exercise. Mental control develops side by side with the muscular, especially the faculties of attention and determination, and after some practice in the art one will be surprised to find how much better the mind works. With mind and eye and hand trained to cooperate perfectly, one will be more proficient in any vocation, whether it involves physical or mental work, or both. It is to be regretted that fencing is not more widely practiced.

The illustrations will serve to acquaint the reader with some of the elementary thrusts and parries of fencing, but will, of course, not be sufficient to teach one fencing. For this, personal supervision is required; illustrations can show only part of a movement, whereas if one sees another person make the entire movement one can easily imitate it. First efforts will be clumsy, however, and the learner will need some one to watch him and correct his errors, as imperfect form should never be allowed to become a habit. Though the illustrations cannot teach fencing, they nevertheless serve a very useful purpose. They show that fencing is not a light exercise, even though constitutional in character. They show also why this exercise develops such a perfect carriage of the body, and why concentration and alertness are so necessary. They show further that any one who expects to become a good fencer must first of all take care of his health through right habits of living, in order to have an abundance of energy, a keen eye, steady nerves and a wide-awake mind. The mere practice of fencing develops many of these characteristics, but cannot do it all. Diet, breathing, bathing, sleep and moderation in all things are very necessary. The illustrations also show that fencing is adapted to the needs of women as well as of men. In fact, it is peculiarly suitable for women, since they are naturally quick and graceful in their movements and have endurance rather than strength. With the light foils now used, fencing is a real pleasure to women and may well form

**Fencing: A
Constitutional
Exercise**



THRUSTS AND PARRIES IN FENCING

In fencing, thrusts are classified and named after the sections of the torso at which they are directed. The parry, counter-thrust or riposte is also thus designated.

Thrusts at the upper right quarter of the torso are classed as in sixte (sixth) and tierce (third); upper left quarter as in quarte (fourth) and quinte (fifth); lower right quarter as in octave (eighth) and seconde (second); and lower left quarter as in prime (first) and septime (seventh).

Modern classification of thrusts and parries divides these into two classes: The High Line and the Low Line. Assaults directed at the upper part of the torso are classed as in the High Line. Those directed at the lower section are classified as in the Low Line.

Photograph 1 shows a thrust by the fencer at left met by parry in prime by fencer at the right.

Photograph 2 shows thrust by the fencer at the right parried in seconde by her opponent at left.

Photograph 3 shows an assault by the fencer at left parried in tierce by her opponent at right.

Photograph 4 shows thrust met by parry in quarte, the lunge here proving itself important.

THRUSTS AND PARRIES IN FENCING

The weapon, whether foil, sword or sabre, is kept in alignment with the right arm, the right foot and the body. The left arm and left foot are kept on the same line. The fencers are directly aligned with each other and it is one of the fundamental principles of fencing form to maintain this alignment.

The right foot and the right arm are kept directed at the opponent, the body being presented sidewise so as to provide as narrow a target as possible for opponent's aim.

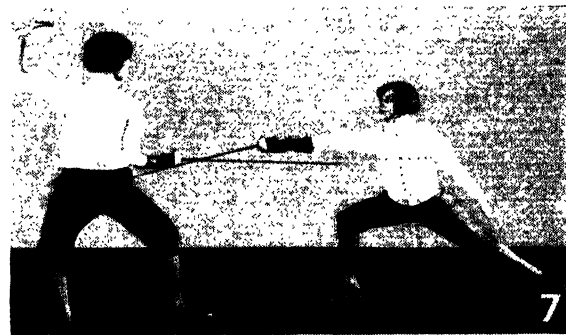
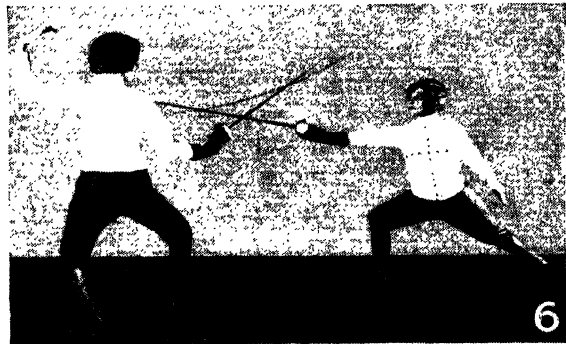
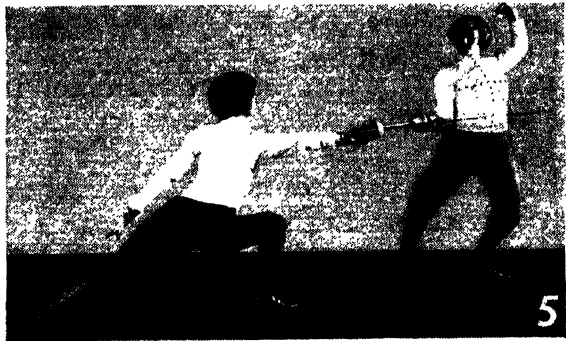
The lunge is an important feature of the attack in fencing. It involves springing forward with one foot and with the arm out-thrust to extend the reach as far as possible toward opponent. The body of the fencer on offense is meanwhile kept as far out of reach of the opponent's foil as possible.

Photograph 5 shows thrust met by parry in quinte.

In photograph 6, the thrust made by the fencer at right is parried in sixte by opponent at left.

Photograph 7 shows an assault by the fencer at right parried in septime by the fencer at left.

In photograph 8 assault of fencer at left is parried in octave by opponent at right.



an important part of their athletic training. A woman will often defeat a man at fencing, if the height, weight and reach are equal. But no matter whether it is man, woman or child who does the fencing, benefit to health is sure to follow.

Singlestick fencing employs a heavy stick of the same length as sword or foil; usually equipped with a basket hilt or guard for the hands. The singlestick may be used with both hands, as well as with one hand singly. The gloves, mask and jacket worn in fencing may be used in singlestick bouts. Like fencing, it affords useful exercise and physical training. The various forms of fencing, including singlestick, are adapted to outdoor exercise.

FISHING.—Fishing, with some people, is a business, while with others it is purely a sport. It cannot be called a branch of athletics, as there is nothing athletic about it. Even fishing for tarpon with rod and reel can hardly be called strenuous exercise. Fishing for trout in a mountain stream will give one some leg and arm exercise, but no more, and possibly less than would be obtained from mountain-climbing. Nevertheless, fishing has a strong appeal for some persons, and for them it has its advantages.

Fishing and
Outdoor Life

So far as ordinary types of fishing are concerned, the chief advantage is the fresh air; but the mental interest will be very helpful to those who are inclined to worry, or who have many cares and responsibilities. There seems to be something peculiarly soothing about fishing, probably because it involves more or less "getting back to Nature." Unfortunately those nervous, excitable people who would be most benefited by it are the least inclined to indulge in it. Fishing which is combined with camping will have the extra advantages of that excellent recreation, and can be more highly recommended.

As the health advantages of fishing are limited and an equal amount may be secured by the novice or the expert, no attempt will be made to describe the different kinds of equipment, to argue on the subject of bait, or to enter into a technical discussion of casting, trolling and the like. Anyone sufficiently interested to go into all this can obtain plenty of advice from the devotees of the rod.

Football as a
Sport

FOOTBALL.—The three games, baseball, basket-ball and football, are the triumvirate of American athletics. The

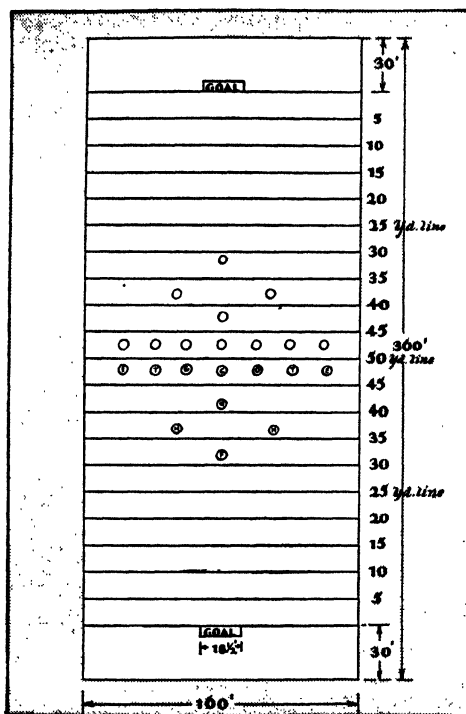
American game of football is known as Intercollegiate and the English as Rugby. There is not much difference between the two games from the health standpoint, so only the details of the Intercollegiate will be given. At present the chief differences are that in the Rugby game there is more passing and kicking and from thirteen to fifteen players take part instead of eleven. The general object of the game, the handling of the ball and the effects upon the health are the same as in the Intercollegiate form. There is a third form known as Soccer, which really fits the name *football* better than either of the other forms, as it is played largely by kicking. This form will be considered under its own heading.

Football in
England and
America

Football requires health even more than it builds it. No one should attempt to play who has not gone through preliminary training to build health and rugged strength. It is a game for those who are already strong. In the exercise regimen it is the finishing touch, the final hardening process, which develops the maximum bulk and density of muscles, ligaments and bones, producing about as tough a body as it is possible to get. Only wrestling surpasses it in this respect. Football requires repeated, rapid and very strenuous efforts, and calls for a good heart and lungs, with plenty of endurance. Every part of the body is employed and the man who plays without preparation, even if only for a few minutes, will be sore all over. One should always start to play the game gradually, practicing its several parts frequently before playing a real game.

General training is as important to the football squad as is actual practice of the game. The diet should be carefully regulated and ample sleep should be secured. When this is done the players ought to finish the season in better condition than when they started, for football is a real developmental exercise and general health-builder. Being played out of doors it combines the advantages of fresh air and sunshine with strenuous exercise and deep breathing, not to mention its great mental interest. It teaches the player teamwork, quick thinking, courage, determination and self-control. On account of these facts the game of football is amply justified, even if players are sometimes rather seriously injured, especially since such injuries are due more to lack of proper preparation for

Football: A
Sport for the
Strong



Plan of a football field, showing the position of the players lined up for a "scrimmage."

that it will give the players merely a sort of happy-go-lucky, rough-and-tumble "work-out." One who is going to play football in accordance with the official rules and to engage in the strenuous competition that it involves, had better prepare by taking general constitutional and developmental exercise, with special attention to the back and abdominal muscles. Practice in sprinting will be helpful for developing speed. After this the various phases of the game may be practiced before attempting any scrimmages. Herewith is given a general outline of the Intercollegiate game.

Football.—Equipment.

The Field: A piece of level ground 360 by 160 feet.

The Goal-posts: Wooden posts about 20 feet high, placed $18\frac{1}{2}$ feet apart, with a cross-bar at a height of 10 feet. A goal is placed at each end of the field.

The Ball: An oval, leather-covered, air-inflated rubber bladder.

Uniforms: Not mere team insignia, but a means of pro-

the game than to its intrinsic hazards. With the new rules injuries are becoming much less frequent.

Of course, football may be modified in many ways so as to make it less strenuous and therefore more available to the majority of persons. The various "plays" can be limited mostly to those calling for passing the ball and running with it or kicking it. Tackling can be regulated or eliminated. Often the mere elimination of competition will be sufficient to lessen the exertion and hazards of the game so

tection from hard knocks. Players usually wear heavy shoes with leather cleats on soles, padded trousers and helmets. Shoulder, hip, elbow and other guards may also be worn.

The Players (Eleven to a side): *Center*, two *Guards*, two *Tackles* and two *Ends*, composing the "line"; a *Quarter-back*, two *Half-backs*, and a *Full-back*, composing the backfield.

The Game.—When the two teams are ready to play they toss a coin to determine which shall have choice of goal or kick-off. If there is a wind the winner usually chooses the goal from which it is blowing, as it will assist him in getting the ball over his opponents' goal-posts. If there is no wind he usually chooses the kick-off. His side then has the ball. It is placed on the 40-yard line, 60 yards from opponents' goal. The other side then spreads out over the field ready to receive the ball as it is kicked. Some member of the side having the kick-off then kicks the ball, usually trying to place it fairly close to his opponents' goal. As the ball comes down it is caught by the opposite side and either kicked back or carried back by some member. When carried, the runner is protected by other members of his team then called the "interference." They do everything possible to enable him to run the entire

Rules of
Football



PHOTOGRAPH INTERNATIONAL NEWSREEL

A group of football players practicing the drop kick.

length of the field so as to place the ball over the goal-line. If he succeeds in doing this it is called a "touchdown" and his side scores 6 points. They then have the privilege of attempting to kick a goal, and if they succeed they score one more point. If the runner fails to make a "touchdown," being "tackled" or forced to the ground with the ball, another play is in order. The players line up from the center, first guards, then tackles, then ends. The quarter-back stands behind center, and the half-backs and the full-back stand behind the quarter-back. The other team lines up in a similar manner so that the players face each other. The ball is then put into play again by the center passing it to the quarter-back and he in turn to another player, who attempts to run down the field and make a touchdown. If he is thrown it is called second "down" and the ball is put into play again. Such a play is called a "scrimmage," probably because the players are pretty well scrambled in their efforts on the part of one side to stop the runner and on the part of the other side to stop those attempting to stop him. If the side having the ball is held for four downs without having advanced the ball 10 yards, it is given to the other side and they attempt to advance it toward their goal in the same manner. There are other methods of advancing the ball besides the scrimmage, however. The first is by kicking. If after a third down there does not seem much chance of making the required 10 yards, one of the backs will kick the ball instead of trying to run with it. This will usually result in the other side getting the ball, but it will be farther from the kicker's

The
Scrimmage in
Football

Kicking



PHOTOGRAPH INTERNATIONAL NEWSREEL

Going through an opening for a touchdown. This shows what can happen in a football game when the offensive line proves effective.

goal-line. Such kicking may be resorted to at any time that it seems advisable. Another method of advancing the ball is by means of the forward pass. After a back has received the ball, instead of running with it or kicking it, he passes it to another player on his side who has run out to the side and forward so as to be ready to receive it with as nearly a clear field ahead of him as possible.

**Forward
Passing**

There are many trick plays which may be worked in the scrimmages with the idea of deceiving one's opponents as to which way the ball is going and thereby getting a better chance to advance it. These plays are identified by a series of numbers which the quarter-back calls out just before the center passes him the ball. As soon as the other players hear the numbers they know which way the ball is going and what to do to assist in advancing it. Of course these "signals" are not known to the other side. If, during the game, one side is near the opponents' goal but there does not seem to be much chance of making a touchdown, an attempt may be made to "drop-kick" the ball over the goal-posts. If this is accomplished it counts three points. This is called a field goal.

**Football
Signals**

If at any time the ball rolls, or is carried, kicked or passed, over the side-lines it is out of "bounds." It must then be brought in at the point where it went out and placed from five to 15 yards inside the line, where it is put into play with a scrimmage. If the ball is intentionally kicked out of bounds it is given to the other side. If any player commits a "foul" by breaking one of the rules, his side will be penalized a certain number of yards. Sometimes the player will be disqualified.

Football is played in four periods of 15 minutes each, known as "quarters." After the first quarter there is a one-minute rest; after the second quarter, which is the end of the first half, there is a 15-minute rest; after the third quarter the one-minute rest is repeated. The team having the greatest number of points when time is up wins the game.

Periods

To be a good football player one should have everything in a physical way—strength, speed, weight and height. The latter two are not absolutely essential, but they do help out. The first two are essential and, if only for safety's sake, any man not possessing them had better stay out of the game until better developed.

GOLF.—Golf is an old Scotch game which for many years was little played outside the land of its birth, but which is now becoming increasingly popular all over the world. No doubt it would be played even more than it is if it were not for the expense attached. The golf course is from three to five miles around and must be covered with carefully tended grass, so that it is an expensive proposition. Then there is the cost of the clubs and the balls and the time it takes to play the game. Usually the course is owned by a club made up of many members so as to distribute the cost. There are now public courses near the larger cities and these are generally crowded. The fact that golf has made such progress in spite of its expensiveness is probably due to the intense mental interest of the game. One may take it up for many reasons, but it is continued for only one reason and that is interest. To the uninitiated the game may seem to be rather dull and monotonous, but after one has played awhile one finds that its natural hazards are not the only ones. Getting the ball and the club together in just the right way is not as easy as it looks and is a constant challenge to the player's skill. Because it looks so easy and his first efforts turn out so poorly, the new player is fiercely determined to do better, and before he knows it he becomes what is popularly known as a golfing "bug." This will not hurt him, as golf has many health advantages, even though it is not strenuous exercise.

**Golf: Its
Advantages**

First of all it is played outdoors where one has the advantages of fresh air and sunlight. The surroundings are usually beautiful, and the green of the grass has a soothing influence. Golf requires much walking, and since it is usually played by those who would otherwise get little of this exercise it just fits their needs. When one has played eighteen holes one has walked about five miles. This cannot fail to have a very beneficial constitutional effect. The swinging of the clubs gives more exercise than is apparent and helps to keep the body flexible and supple, which is important in maintaining a good circulation. Hitting the ball also develops coordination and muscular control, and following it with the eyes is good exercise for these valuable organs. Last but not least, there is the value of the play spirit which is especially noticeable in golf. It helps to keep the players young and takes their minds

off weightier matters. While golf will never develop much strength or bulk of muscle, it has saved more than one life through its general constitutional and mental effects.

There are few who play golf professionally, but the veriest amateur is interested in anything which will help him improve his score. Plenty of information is available from instructors and books on how to play golf, but few give any attention to the player's health. As in all games, the man who possesses in the highest degree the qualities required has the best chance of winning. The qualities required for golf are health, steady nerves, endurance, muscular coordination, agility and good eyesight. The mere playing of the game helps to develop these, but if one wishes to make rapid progress one will give attention to other factors as well. Health depends not only on exercise and fresh air, but upon diet and sleep and every other phase of right living, while he who would acquire the steady nerves of the successful golfer will especially avoid all nerve irritants, such as tobacco, alcohol, tea and coffee. Muscular coordination, agility and endurance can be improved by the practice of rope-skipping, shadow-boxing, bag-punching and general calisthenics. Golf does not give so much exercise that these other forms cannot be taken with advantage. If the eyesight is poor it can be improved by following the directions given elsewhere in this Encyclopedia. Practice is of course indispensable to skill in playing, but with the proper health foundation progress will be more rapid.



Interlocking grip as used in golf.

Health
Benefits of
Golf

The rules governing the game of golf are not extensive or hard to learn. It is the game itself that requires brain work. One must learn to choose the club best suited to one's individual needs as well as for the various strokes of the game. One must learn the "stance" (position of the body) for each stroke, the proper "address" (preparation for hitting the ball) and the correct swing. The method of gripping the club is also important. The following will give a general idea of how the game is played.

Golf.—Equipment.

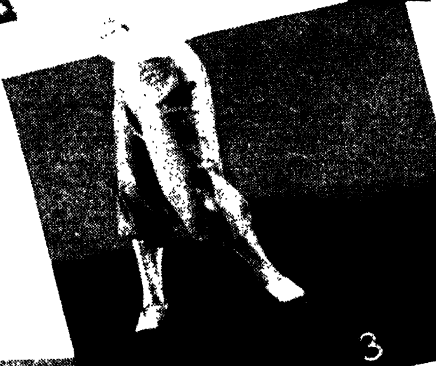
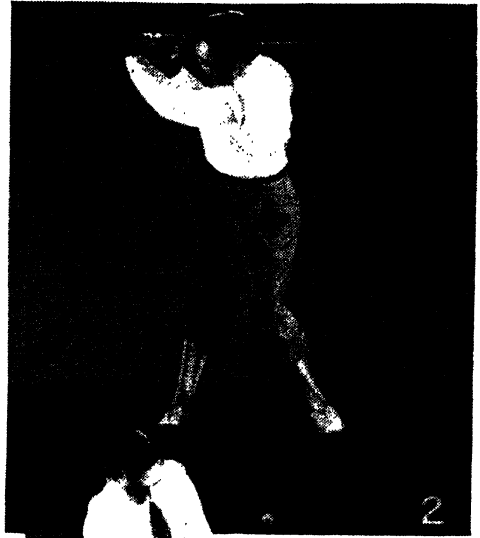
The Golf
Course

The Links: A stretch of rolling ground, preferably with small streams running through it, is generally selected in order that there may be many natural "hazards." A series of 9 to 18 holes (18 for the full-sized course) are placed at various points on the course at distances of from 100 to 500 yards. Each hole is $4\frac{1}{2}$ inches diameter and surrounded by a smooth ground of considerable size, covered with carefully cut grass and known as the putting-green. Often the putting-green is surrounded by an artificial mound of earth known as a "bunker." The bunkers and natural hazards are for the purpose of making it more difficult to get the ball onto the green. At the start of each hole is the "teeing-ground." Here the player makes a small eminence of sand, called the "tee," or uses a specially prepared one on which he places the ball for his first drive. The tee permits the club to have a free sweep at the ball.

The Ball: A small, white, very resilient ball which must not be less than 1.68 inches in diameter nor weigh more than 1.62 ounces.

Golf
Equipment

The Clubs: There is quite a variety of clubs which may be used, and they vary somewhat in length of head and shaft and in weight, according to individual preference. The shape of the head determines the use and name of the club. The most generally used are the *driver*, the *brassie*, the *mid-iron*, the *mashie*, the *niblick*, and the *putter*. Then there are the *spoon*, the *pitcher* and various kinds of mashies such as the *mashie-iron*, the *mashie-niblick*, etc. The driver, brassie and spoon are wooden-headed clubs as a rule, while the others are iron-headed. The shafts may be of either wood or steel. The driver, brassie and spoon are used for making long straight



CORRECT POSITIONS FOR GOLF

1. Stance for drive. 2. Swing for drive. 3. Swing for iron shot. 4. End of swing for approach shot. 5. Stance for mashie niblick. 6. Stance for putting.

drives. The others are used for shorter strokes where it is necessary to lift the ball higher. The height of the ball will be progressively greater with the following clubs: mid-iron, mashie-iron, mashie, mashie-niblick, niblick. The putter is used on the putting-green, for the last one or more strokes in putting the ball into the hole.

The Golf-bag: A canvas or leather bag for carrying the clubs and balls.

The Players.—Golf may be played individually or with partners. When two play on each side the game is called a "foursome."

The Game.—The player starts by placing his ball on the tee and making as long and straight a drive as he can toward the first hole. His companion or companions then takes his turn at driving. The man whose ball is farthest from the hole then takes the next shot and this plan is followed throughout. After the players have placed their balls in the first hole they take them out, tee again and drive toward the next hole. The balls are put in all the holes successively to complete the game. The number of strokes a player will require for each hole will depend upon his skill and the hazards. If the ball is driven off the course it is said to be in the "rough," as the ground is much rougher and harder to play on. It may require several strokes to get back onto the course. The usual method of scoring is to count the number of strokes required to complete the course. The lowest score wins. Each hole is supposed to be made in a certain number of strokes known as "par." The skill of a player is indicated by his accuracy and his ability to overcome or avoid the natural hazards, such as small irregularities in the ground, the wind, the weather in general—which affects both balls and clubs—hillocks, streams, etc. One may play the game for years, but these hazards will still present their problems. The fact that the championship seldom remains in one person's hands for two successive years shows the elements of chance that are in the game and the skill required, and these account for the great mental interest which the game arouses.

HAMMER-THROWING.—See *Weight-throwing*.

HANDBALL.—Handball, as its name signifies, is a game of hitting a ball with the hand. The ball is struck against a wall,

and as it bounds back is struck again. It is a game of endless interest and is constantly increasing in popularity. This is well, for it has great health value. It is chiefly a gymnasium game, but is now being played out of doors more and more. It is always best to play outside, but if only an in-

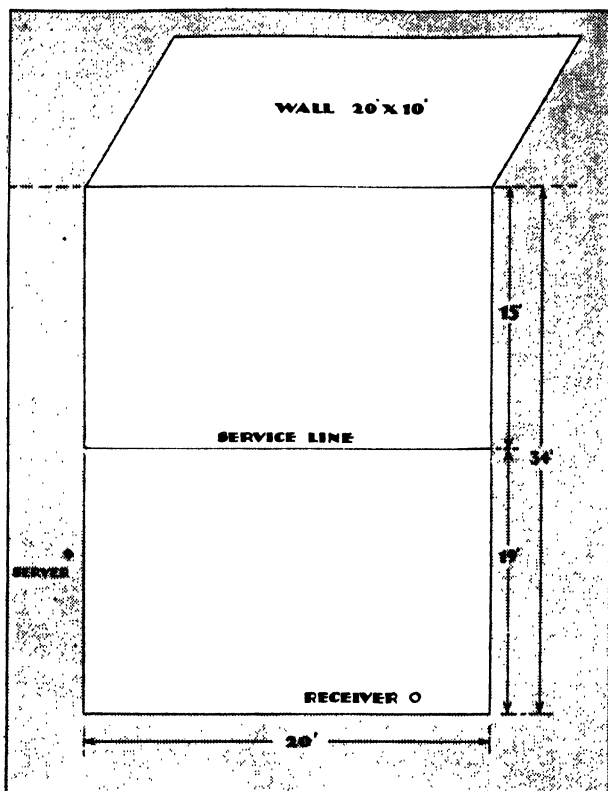


Diagram of a handball court showing the positions of the receiver and the server.

door court is available this is no excuse for neglecting the game. It requires considerable skill to play effectively, but this helps to maintain interest. Some rich men have become so interested in the game that they have had their homes equipped with a court in a sound-proof room where they can play without disturbing the other members of the family.

The exercise obtained from a game of handball is of the constitutional variety and includes practically every muscle in the body. The left arm is used as well as the right, and the legs are constantly in motion. There is much bending and twisting of the body and neck. The movements are very active and sufficiently vigorous to develop some strength. Endurance, however, is the main quality developed, and endurance and health go hand in hand, for this quality depends upon active functioning of every organ in the body. The

**Handball and
Endurance**



Position for serving in handball.

Technique in Handball

As it is not so easy to strike a flying ball and keep it going within bounds, the new player will soon find that considerable skill is demanded. Proficiency depends upon endurance and coordination, and these depend upon health as well as practice. The vegetarian diet is most conducive to endurance, but over-eating must be avoided. Plenty of sleep is also necessary. If the eyes are faulty they should be given appropriate relaxation and exercise. Running and rope-skipping may be included in the training.

Handball.—Equipment.

The Court: This is made either of wood or concrete, and consists of a floor with a wall at the back for single-wall handball, the court measuring 20 feet in width and 34 feet from wall to backline. For four-wall handball, the court measures 22 feet in length, 46 feet from wall to backline, with the side and back-walls 22 feet in height. The service-line is 15 feet from the front-wall for the single-wall game, and 18 feet from the front-wall for the four-wall game. For the latter game an additional line 23 feet from the front of court parallels the service line to create a 5-foot service space. Both floor and walls should be smooth, to insure ball rebounding evenly.

exercise demands deep breathing and usually brings about free perspiration, so that elimination is improved. Of course the circulation is markedly increased. The game is excellent for reducing; but in spite of the great activity and energy it demands it is not so strenuous that any normal individual cannot indulge in it. The speed of the play may be varied at first to meet the requirements of new players, but it will not be long before they can keep up with the others. This demonstrates its value as a builder of health.

The Ball: Air-filled rubber, $1\frac{7}{8}$ inch diameter, $2\frac{1}{4}$ ounce weight. This is standard, but a ball $2\frac{1}{4}$ inch diameter and 2 ounce weight may be used.

Gloves: Light leather gloves with stiff palm may be used if desired.

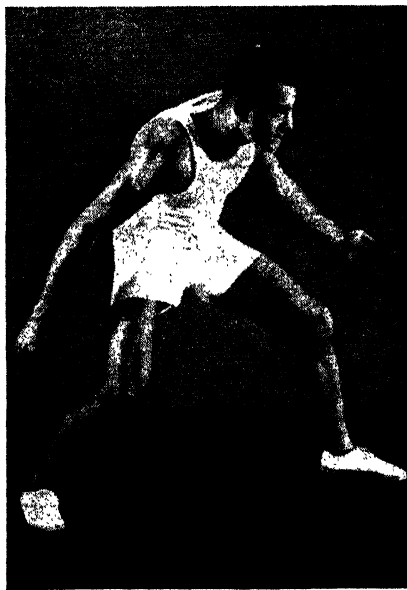
The Players.—Handball may be played individually by the man and his opponent, or it can be played “doubles,” with two on each side.

The Game.—The theory of the game is that the player's whole attention is devoted to placing the ball in such a way that his adversary cannot return it and so loses the point. The ball must be continually kept in motion and must be struck on the fly or on the first bound. In no instance may it be caught or struck with both hands at one stroke.

For practical illustration let us say that A and B are about to begin a game. They toss a coin for serve and A wins. In handball only the server can score points; he continues to serve until he is put out, that is, fails to return a ball properly. A, the server, stands back of the “ace-” or service-line, anywhere he pleases, drops the ball with one hand, and, as it bounces up, strikes it against the wall.

He has two tries to make it fall into the court between the service-line and the back-line. If he fails in both attempts he ceases to be the server and changes places with his opponent. If he does make a proper serve and the other man returns the ball to the wall in such a way that the server fails to get it back, he is “put out” and has to give up the serve to the other man. In that case no one will have scored a point—for only the server can score. The man who scores 21 points first wins the game. To become the

Handball as
A Game



The player ready for receiving the ball on its return illustrates the alertness essential in handball.

server and keep the serve is naturally a great advantage in scoring, so that one should strive to develop a service that will be very difficult to return. If opponent fails to return the serve the server scores a point. With good players there may be anywhere from 5 to 15 plays in a rally before the point is finally decided. Back and forth the players go, first one driving the ball high up on the wall to force his adversary back into the court, then perhaps shooting it low on the wall in an attempt to make a "kill." The best way to hit the ball is in "loose-handed" fashion with hand open and wrist swinging free. The arms should never be rigid and should snap the ball rather than strike it stiffly. It is important to practice with the left hand as well as the right, as much depends on being able to use both hands equally well.

**Team-Work
in Handball**

The "doubles game" is much less strenuous, but since it gives four people a chance to use the court instead of two, under certain conditions it is useful. Handball doubles are similar to tennis doubles. A and B play against C and D. The former are the servers, the latter receive. A goes in and serves; if he is put out, B gets a serve. If B is put out too, the sides change places and C and D each get a serve. When the game is properly played, A and B divide the court with an imaginary line, and each *covers his own half*. Utter confusion of the game follows the attempt of one partner to encroach on the other's territory. Once in a while, when, perhaps, A has been forced into the back-court, it may save the point for B to rush across and take a return that his partner seems too far back to handle. But nine times in ten, unless a "kill" can be made, the result will be confusion and eventual loss of the point. Here is where team-work counts and the players have an opportunity to learn cooperation.

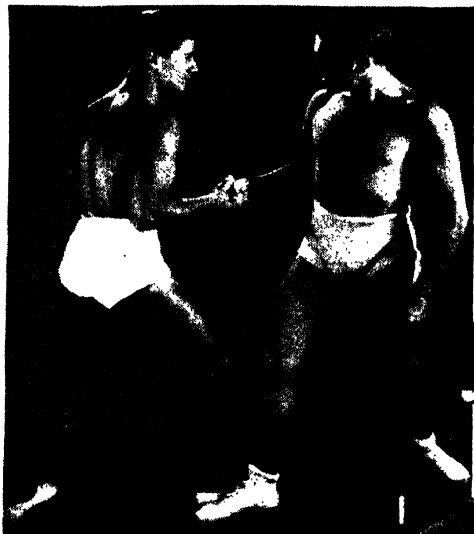
HAND WRESTLING.—Hand wrestling is a very interesting form of athletics, as the mind must be used as well as the body. It is not so violent as ordinary wrestling, yet it gives one plenty of exercise. As long as the two contestants are about equally matched as to height, weight and reach, this exercise may be taken by the weak as well as the strong, and by women as well as men. In fact, there is no objection to bouts between men and women as there is no danger of injury, and skill on the part of the woman may offset any superior strength which

the man may possess. Hand wrestling is also valuable exercise for children. It has the further advantage that it may be practiced anywhere. A mat is not required, nor is any special costume necessary, though it is always well to wear the minimum of clothing when indulging in any athletic contest.

The health benefits of hand wrestling include exercise, deep breathing and perspiration. The exercise is greater than might appear. The mere effort to maintain balance requires the use of most of the muscles of the body. The shifting of the weight and the movements of the arms, while keeping the feet in one place, call for much body-bending and twisting. The effects are constitutional rather than developmental, though if one wrestles frequently some development will be secured, especially of the forearm. It is a good method of strengthening the grip. It is well to practice left-handed bouts as well as right-handed ones, in order to insure a balanced development and to educate the muscles of the left arm and the motor-centers in the brain which control them. The exercise is sufficiently vigorous to induce deep breathing; but there may be a considerable tendency to hold the breath and this should be guarded against. Form the habit of breathing regularly, even when making sudden exertions. It will increase the endurance. Most people do not perspire nearly enough, but a few good bouts of hand wrestling will soon correct this. Further advantages of hand wrestling are the development of muscular control, quick thinking, a fine sense of balance and determination.

Health
Benefits of
Hand
Wrestling

The technique of hand wrestling is as follows: The two contestants stand facing each other with the legs spread apart and the right foot of one placed outside of and against the right foot of the other. The hands are gripped together as in a hand-shake and should be centered over the feet. The contestants may push, pull or jerk each other in any direction desired, the object being to throw opponent off balance so that he will have to move his feet or go down completely. To move either foot, or to place a hand, knee or any part of the body against the floor, constitutes a "fall." It will thus be seen that mere strength is not sufficient to win, for one may, by suddenly ceasing resistance or changing the direction of resistance, cause an opponent to lose balance from the force



HAND WRESTLING

A few simple movements. (See next page for description).



Many variations and combinations of these movements may be devised after a little practice.

HAND WRESTLING

1. Starting position in hand wrestling. The combatants grasp each other's hands firmly, in a position immediately above the feet, which are placed with right sides against each other when wrestling with the right hands. Position is reversed when the left hands are gripped. The wrestlers now begin to pull, push and jerk, each attempting to unbalance his opponent.
2. From starting position, one may give opponent's hand and wrist a sudden hard twist to the left (opponent's right), which will often succeed in throwing him off balance. If he succeeds in maintaining balance he may try to counter as in 3.
3. This attack may be started from position in 1 or may be employed as a counter from position in 2. One gives opponent's hand a quick hard thrust backward and out to the side. The mere backward thrust is not so effective but when combined with the outward pull it will often result in a throw. Care must be observed to maintain one's own balance.
4. When both wrestlers have been pushing hard one against the other, if one should suddenly cease all resistance, and give a smart pull, his opponent's pushing force plus the pull will throw him down as illustrated.
5. A frequently effective move. Give opponent's hand a hard pull forward, at the same time partially turning the back to him without moving the feet, and dragging his arm over your right shoulder. Then by bending the body you may lift him off his rear foot.

of his own attack. Feinting is important, and the mind must be kept constantly on the alert to take advantage of every opening and to anticipate as far as possible what one's opponent is going to do.

In order to excel at hand wrestling it is well to take extra exercise to develop all the muscles, and to practice bending and swinging the body in all directions without losing balance. Some advantage may be gained by exercises for developing the gripping power of the toes, and whenever possible bouts should be conducted in the bare feet, so as to make it easier for these members to cling to the floor. It is important to have a good grip, for a movement of the wrist may mean the difference between victory and defeat. However, any extra exercise taken for the wrist should be designed to make it supple as well as strong. Due attention should be given to all general health-building measures. A clever person can figure out various little tricks which may help him in taking an opponent unawares and throwing him off balance. See also *Wrestling*.

HARE AND HOUNDS.—This is a game which consists essentially of cross-country running. The central idea is the chase and the name indicates its nature. The game is not indulged in very generally, for few people are able to do the necessary running, even though the amount of endurance required is no more than any normal individual should have. It is used to some extent in colleges as a part of a general training regimen. Those who are interested in it, however usually organize themselves into small clubs known as "Harriers" and hold weekly runs.

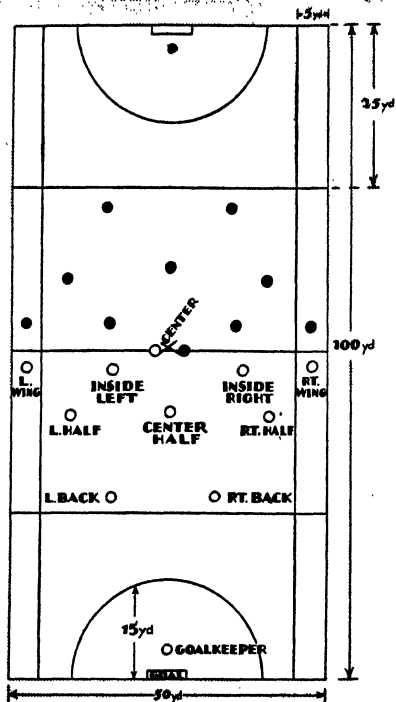
The constitutional and general health value of this game is very great and it is worthy of becoming more popular. It develops heart and lungs, and in so doing also improves every function of the body, thereby giving one strength, stamina and endurance. The running is done at a moderate pace so that there is no strain, but is continued long enough to greatly accelerate the circulation, to give one a thorough shaking-up, and to force deep but not labored breathing. Of course it is done out of doors where one has the benefit of fresh air. Frequently, especially in the clubs, a regular running costume is worn, so that, along with the exercise and

deep breathing, one has the advantage of an air bath and often a sun bath. All this helps to purify the system, and a harrier, if he lives rightly in other respects, is seldom if ever sick.

There is not the same competition between the opposing sides in a human game of hare and hounds that there would be in an actual animal chase. When the game is played chiefly for pleasure and health benefit there is often little or no competition. The "hounds" do not try to catch the "hares," but merely follow their trail to the end. When it is desired to inject some element of competition, the hares are given a good start and the hounds do their best to catch them before the end of the trail. The method of playing the game is simple. The two men who act as the hares carry bags filled with bits of torn colored paper, which they drop as they run so as to form a trail. When they have had a few minutes' start the hounds (the rest of the runners) take up the trail. It is most interesting to run through country which is hilly and wooded, as the hares will then be out of sight most of the time. But even when the hares are in sight and a short cut would enable the hounds to overtake them, the latter must follow the paper trail. The idea of using colored paper is to increase visibility on all kinds of ground. However, white may be used if necessary. The run is generally made in a circle, so as to end up near the starting point, but that circle may and should be quite irregular, in order to lend interest. Running over rough country naturally increases the amount of exercise obtained.

It is not absolutely necessary that the runners keep running all the time. Beginners should not attempt to run the full distance. They can train by taking shorter runs, or they can alternate walking with running, regulating the pace according to their individual ability and without regard to the progress of others. All the rules of good training should be observed. If one runs regularly it is well to use a vegetarian diet, as it is more conducive to endurance.

HOCKEY, FIELD.—There are two kinds of hockey, field hockey and ice hockey. The former is now played mostly by girls' teams and the latter by men, probably because it is more dangerous on account of being played upon skates. However, field hockey is also played by men, and the common form



Plan of a hockey field, showing the positions of the players lined up for the "bully," which starts the game.

known as "shinny" is very popular with boys. The general idea of the game of shinny is the same as that of field hockey, but the rules are much simplified. In fact, about all the rules there are would be included in keeping on side and keeping after the ball until one side or the other scores a goal. A mere line is used for the goal instead of the regulation goal-posts and net, and the field is not marked with lines. Practically the same health benefits may be obtained from shinny as from field hockey, but since the latter is more scientific it requires and develops better coordination.

Health Value of Hockey

Field hockey is a game which calls on every muscle of the body and is excellent for increasing endurance and improving general health. The constant running necessary in passing the ball up and down the field strengthens not only the legs but the heart and lungs, and is the chief reason for the endurance developed by the game. The manipulation of the stick, in hitting and following the ball and in interfering with opponents, gives the shoulders, arms, wrists and fingers splendid exercise. The constant bending and twisting of the body, together with the deep breathing induced, gives the body an internal massage, promotes normal bowel action and stimulates the spinal nerves. Such strenuous exercise out of doors is certain to produce a good appetite, together with the ability to digest and assimilate what is eaten. Because of the keen competition and the skill required to play effectively, the game is a very inter-

esting one, so that all in all hockey gives about every health benefit that can be obtained from any sport.

It is a good thing that the game has become so popular with women, because they need such active outdoor sport and because it develops the womanly characteristic of possessing strength and endurance without great bulk of muscle. In order to become proficient in the game practice is of course necessary, especially practice in the manipulation of the stick. If one does not have much time for actual practice, one can do much to improve one's play by using the various exercises given in another part of this book for strengthening the fore-arms and fingers. Then the time available for the game can be used to better advantage. Running and rope-skipping, as they help to develop endurance, are also useful when opportunities for playing are limited. Of course, due attention should be given to every phase of right living so as to conserve the nervous energy. The ability to relax is very important in this game, so that no energy will be wasted by useless tension when one is not actually engaged with the ball. Overeating should be guarded against, since it makes one short-winded.

Hockey as
Woman's
Sport

The main points in a regulation game are given below.

Field Hockey.—Equipment.

The Field: A level, smooth stretch of turf, 100 by 50 yards, the length divided by cross-lines 25 yards apart. There is also an extra side-line 5 yards inside the main one which is called the "five-yard line." A semi-circular line, 15 yards deep, is drawn about each goal. The goals are located at each end of the field and consist of two uprights, 4 yards apart, with a cross-bar connecting them. Wire or netting is usually placed between and behind the goal-posts to catch the ball.

The Ball: Leather-covered, 9 inch circumference, 5½ ounce weight; the same as a cricket ball except that it is painted white.

The Stick: Round, with a curve on one end, 35 to 38 inches long, 18 to 21 ounce weight. Length and weight adapted to the individual who is to use the stick. Material is ash or hickory, though some have cane handles.

Uniforms: Not absolutely necessary, but the protection of shin-guards is very welcome to most players. Gloves are also helpful and shoes with a non-slip sole should be worn.

The Players (Eleven to a side): Five *Forwards*, three *Half-backs*, two *Full-backs* and one *Goal-keeper*. See illustration for position of players on the field. The *Forwards* are known as *center Forward*, *inside-left* and *inside-right*, *right* and *left Wings*. The *Half-backs* are known as *center*, *right* and *left Half*, and the two *Full-backs* as *right* and *left*.

The Game: The object of the game of hockey is, of course, to score goals by driving the ball between the goal-posts. Each goal counts one point and the side having the most points when time is up wins the game. The total playing time is 60 minutes, divided into three periods of 15 to 20 minutes each. This time may be shortened if desired by both sides.

The game is started by what is known as a "bully." The teams line up opposite each other, and with the center forwards in the middle of the field, facing each other and facing the side-lines, so that their left shoulders are directed toward their opponents' goal. The ball is placed between the two forwards; then each one strikes the ground on his or her own side with the stick and afterward strikes opponent's stick. This procedure is repeated three times, after which either forward may hit the ball, whichever one can reach it first. This is the "bully." The center forward who gets the ball will usually pass it to another forward on the same side, and he (or she) will attempt to pass it down the field toward the goal by a succession of short hits called "dribbling." All the other forwards follow along behind, ready to receive the ball if the player having it should find it necessary to pass it on account of attack by an opponent. Of course, all this time the opponent backs will be doing everything possible to gain possession of the ball by hooking it with their sticks. If one is successful he or she starts "dribbling" the ball toward the opponents' goal. Thus each side continues its efforts to get the ball down the field toward the goal until one or the other succeeds in getting it as far as the circle. Once the ball is within the circle a goal may be tried for. Of course, even here the backs on the other side will continue their efforts to prevent the goal, and so will the goal-keeper. The goal-keeper can use hands, feet or stick to stop the ball and if successful will immediately strike or kick the ball out of the circle where the other players of the team can gain possession of it and start it



PHOTOGRAPH EWING GALLOWAY

PLATE 39. Girl outdoor enthusiasts taking part in Canadian winter sports.
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toward the other goal. If a goal is scored, however, play ceases while the teams return to their original positions for another bully.

There are various fouls which may be committed, such as playing off-side, "sticks," undercutting, rough play, etc. "Sticks" means swinging the stick above the shoulder-level when hitting at the ball. Undercutting is a stroke which makes the ball shoot up into the air. Various penalties may be assigned, such as a bully, a free hit, a penalty corner or even suspension. If the ball goes out of bounds, it is rolled in at the point where it went out by a member of the team opposite to that of the player who last touched it. If, however, the ball goes out of bounds off the sticks of two opponents, a bully is taken inside the side-line at the point where the ball went out. The fine points in the rules need not be observed when merely playing for health. There is one point that should always be observed, however, and that is the one requiring each member of the team to play in his place. If each member looks after his own territory and does not attempt to play two places at once, there will be much less interference and the team will make out better. Adherence to this rule also teaches self-control and judgment.

Fouls and
Penalties

HOCKEY, ICE.—Ice hockey is an even more strenuous game than field hockey. Since it is played with skates on the ice, the players can move about very rapidly and the game becomes extremely speedy. To play a good game three things are required: the ability to skate well, speed and dexterity in all movements, and general good health and endurance. One must be able to start, stop, and turn rapidly on the ice without losing balance; to move the body and manipulate the stick or hockey with speed and precision; and to keep going at top speed most of the time. These qualifications require attention to every phase of right living, as well as practice in skating and in the game. The ability to relax in order to conserve energy is also important.

Ice Hockey

Ice hockey, besides having all the health advantages of the field game, has the additional one of being played in cold fresh air, which is very tonic and stimulating. To be sure, field hockey is often played in quite cold weather, but only when it is cold enough to freeze ice out of doors for a rink is there the

real snap in the air which brings color to the cheeks and makes one feel intensely alive. Although ice hockey is now often played indoors, anyone playing for health will always seek an outdoor rink.

This game is so valuable as an advanced constitutional exercise that it is to be regretted that the opportunities for playing it are not more general. A greater interest is being manifested each year, however, and perhaps in time we shall have as many hockey rinks in the winter as we have tennis-courts in the summer. When played regularly, with suitable rest periods, ice hockey will make one "hard as nails."

Ice Hockey.—Equipment.

The Rink: A smooth stretch of ice about the same size as the field-hockey field, surrounded by a low fence of wood. The goal-posts are set on the ice at each end. These consist of a steel frame covered with twine netting.

The Puck: A disk of hard rubber, 3 inch diameter, 1 inch thick. This is used instead of a ball so that it will glide over the ice instead of bouncing.

The Stick: Similar in general appearance to that used in field hockey, but with a flat blade. The length of the sticks and the angle of the blade vary, each player selecting the one which best suits his own style. The goal-keeper's stick has a broader blade than the others.

The Skates: Special skates are made for hockey and these should be used, as it is necessary that they be exceptionally strong, yet light. They should always be riveted to the shoes. The so-called tubular skates are best in most cases. They should receive exceptional care, as much depends upon them.

Uniforms: Not absolutely necessary, but special gloves and shin-guards are desirable when playing in competition. The goal-keeper may have the entire leg guarded.

The Players (Six to a team): *Right and left Defenses, right and left Wings, Centers and Goal-keeper.*

The Game.—Ice hockey is played quite similarly to field hockey. The teams line up in the same way with the centers in the middle on each side of the puck. The wings are stationed to right and left of the center in the positions of the forwards in field hockey. The two defense men have much the same duties as the backs in field hockey. The goal-keeper is the

same in both cases. The first play is known as the "face-off," instead of the "bully." After the puck is in play, each side makes every effort to work it down the rink until within shooting distance of the goal defended by their opponents. Most of the offensive work is done by the centers and wings, while the defensive work is left to the defense men and the goal-keepers. Rules in regard to "off-side" and fouls are about the same as for field hockey. The time limit is in some cases as short as fifteen minutes per period and never exceeds twenty. The game is so strenuous that it cannot be continued long.

HORSEBACK RIDING.—In these days of the automobile, horseback riding, which was formerly an everyday affair, like walking, has become almost purely a sport. Even in the country, where the farmer's children used to learn to ride at a very early age, horses are now scarce and the ambitions of the farmer boys and girls are directed toward a sport roadster instead of a fast horse. But horseback riding will always have its devotees, and there are few who have tried it who do not like it. Unfortunately, opportunities for riding are rare in these days, when nearly everyone lives in cities and both urban and country folks use motor transportation of some kind. Horseback riding has now become a sport for those who have money and leisure. Nevertheless, the horse still holds an important place in many parts of the world.

Horseback
Riding: Its
Value

The health advantages of horseback riding are great enough to be well worth while. There is always the advantage of the fresh air and sunlight and the mental refreshment of change of scenery. There is also a peculiar exhilaration and sense of power associated with riding a horse, and the attachment which often grows up between the horse and its rider is another valuable health factor. One cannot express love, even for a horse, without producing more harmonious vibrations of mind and body. The constant shaking up and down which one receives when riding is stimulating to the circulation and also to the nerves, because of the alternate flexion and extension of the spine. In addition, the shaking administers a sort of internal massage which favors the peristaltic activity of the intestines. One naturally breathes more deeply when riding because of the exhilaration, even though the muscular exertion

is not great. It is chiefly in the matter of exercise that horse-back riding is lacking. The horse gets much more exercise than the rider. The latter gets some for the legs in gripping the horse and some for the trunk in maintaining proper posture and balance; but that is about all. Generally speaking one may indulge in riding whenever the opportunity offers, with nothing but benefit to the health, though one should not depend upon this alone for one's exercise. It is well to do some walking in addition, to take general exercise, and also to indulge in other sports and games. For those who enjoy riding, polo makes an excellent game.

**Learning to
Ride**

In learning to ride, the important thing is to avoid stiffness and tension, though it is also possible to be too slouchy. A sort of elastic springiness of the spine should be maintained, so that the general posture will be erect even while yielding to the undulating motions of the horse. Get acquainted with your horse and do not be afraid. There are all kinds of horses and they have different kinds of gaits, and it is well to be able to adapt oneself to the different ones. As to saddles and riding clothes, etc., personal preference is usually the deciding factor. Those which are most comfortable should be chosen. Spurs are seldom if ever needed, and it is better to learn to get along without them. Fast riding should be practiced now and then in case it should be needed for an emergency, but racing should be left to the jockeys. There are no health advantages in racing, and there is too much excitement, as well as too much danger. Consider your horse as you would yourself; go out together to have a good time and both will benefit.

HUNTING.—Hunting, from having been a necessity, has become merely a pastime. Since the element of necessity has been removed, hunting with a camera is to be preferred to hunting with a gun, for it is less destructive and more interesting. But as long as the destructive emotions are not unduly excited, hunting in any fashion will be beneficial to the health.

**Hunting and
Health**

Hunting is always associated with walking out of doors in all kinds of weather and carrying more or less of a load. A long trip is usually associated with outdoor camping. This sort of life is getting back to the primitive and is a welcome relief from the enervating influences of too much civilization.



PHOTOGRAPH WIDE WORLD—UNDERWOOD & UNDERWOOD

PLATE 40. Athletes of the younger generation taking a hurdle, compared (in inset) with schoolgirl at exercise twenty years before.

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It hardens one to exposure and long walks, and teaches one how to look after oneself in the open with the minimum of conveniences. This develops initiative, courage and self-reliance, and these lead to self-control, a very necessary attribute in the building and maintenance of health. The exercise obtained from hunting is constitutional in character, though if it includes much mountain-climbing it will be developmental to some extent. In any case it will build a fair degree of strength and plenty of endurance. The outdoor life improves the elimination, builds up the power of resistance and renders one more immune to disease, especially those diseases of civilization, colds and catarrh. Of course, if the best results are to be secured, it will be necessary to take along the right foods, to omit tobacco and alcohol and to avoid overexertion. Hunting will also be found to be excellent training for the senses of sight, hearing and, to some extent, smell.

There are many kinds of hunting, each having its peculiar advantages, and when possible it is well to indulge in various kinds in order to obtain the maximum benefits. The equipment required will depend on the game being hunted and the character of the country, and any store dealing in sporting goods can usually supply the necessary information. It is well to engage a guide when hunting in unfamiliar country or for unfamiliar game. If a gun is being used, it is important to carry it in the proper position under the arm, with the muzzle pointing downward, and to shoot only when very sure of what the target is. Every hunting season takes its toll of hunters because of carelessness on someone's part.

Kinds of
Hunting

Hunting should not be the only form of exercise included in one's health-building regimen. It may take the place of walking and games, if indulged in more or less regularly, but some developmental exercises should also be taken, particularly in the reclining position. This will not only give one better health and a more symmetrical development, but will make one a better hunter.

HURDLING.—Hurdling is a combination of running and jumping and is consequently a very strenuous form of athletics. For this very reason, however, it is an especially valuable one. It develops both strength and endurance, even though the longest hurdle race is usually but 220 yards. Hurdling is

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included in all track and field meets, and hence is practiced in all schools, colleges and athletic clubs.

Health Values of Hurdling

Hurdling is especially valuable for developing strength of heart, lungs and legs; yet the arms and body receive more exercise than is apparent. The arms are used both in the start and in assisting to lift the body over the hurdles, not by placing the hands on the hurdles, but by adding to the upward momentum through a vigorous lift of the arms into the air. The abdominal muscles are used in starting and in lifting the legs over the hurdles. In fact, the effort is so great in hurdling that practically all the muscles of the body are more or less tensed. The large muscles of the thighs are called upon for the most work, and the action of these muscles always has a marked effect on the circulation, thus calling for greater heart and lung activity and leading to the development of these organs. Then the

fresh air, deep breathing, sunshine and period of training necessary for running such hurdle races, are all valuable for the health. One can run the hurdles without racing which makes the sport interesting.

The equipment required for hurdling includes the hurdles, a cinder track if possible, and spiked running shoes, with the usual track costume. The hurdles are square frames of wood made in



PHOTOGRAPH INTERNATIONAL NEWSREEL

In leaping the hurdle the free or front leg should be extended straight forward over the bar, the other leg, from which the leap is made, trailing behind, the hurdler jumping no higher than necessary to get over.

two parts, an upper and lower, so as to be adjustable for height. The upper part is arranged so that it will swing in one direction, thus preventing the hurdle from being overturned if struck by the foot of the runner. This arrangement is only used in practice, however, as in competition the hurdles must be rigid. The two usual forms of hurdle race are the 120-yard with high hurdles and the 220-yard with low hurdles. In the former the hurdles are adjusted to a height of 3 feet 6 inches and are placed 10 yards apart, the first one being 15 yards from the starting-line. In the latter they are adjusted to a height of 2 feet 6 inches and are placed 20 yards apart, the first one being 20 yards from the starting-line. Ten hurdles are used in both races. When children or women are running a hurdle race the height of the hurdles may be reduced to as low as two feet. Each contestant must have his own series of hurdles to jump, these being arranged in lanes. If a contestant knocks over three or more hurdles, or does not jump completely over them in the proper manner, he is disqualified.

Equipment
for Hurdling

In training for a hurdle race the three important points are the start, speed and regularity of stride. Since hurdling is much like sprinting, the start is very important, for every fraction of a second counts. The runner should get away quickly and fall immediately into his stride. It is well to number the steps taken between hurdles so as always to take off from the same foot. This will also aid in maintaining regularity of stride. The jump over the hurdle should be in the form of a large step, lifting the forward leg well up and over and trailing the rear leg. One should not jump any higher than necessary, as it not only wastes energy but cuts down on one's speed. By constant practice one will learn just how high it is necessary to lift the feet to clear the hurdle smoothly and cleanly, yet with little space to spare. The forward foot should come down on the other side of the hurdle, and the rear foot should follow in such a manner as to continue the running stride without interruption. Actual hurdling should not be practiced more than twice a week, the balance of the time being devoted to practice of starts and sprinting. As in other athletic sports one should go slowly at first, perfecting one's form before attempting to develop speed.

Hurdling: A
Field Sport

In the Olympic games there is a 440-yard hurdle race in which the hurdles are 3 feet high and 40 yards apart, but this form is not so generally practiced as those mentioned above. It is a race requiring great stamina, and if one wishes to train for it it will certainly give splendid endurance.

Ice-Boating ICE-BOATING.—Ice-boating is not a game. It is a sport, and usually a group sport, because most boats carry more than one occupant and at least two boats are required if there is to be a race. It is not necessary to race in order to experience the joys and secure the benefits of ice-boating, but an occasional bit of competition lends interest.

An ice-boat consists of a triangular framework with the apex to the rear and steel runners attached to each corner. It is somewhat like a three-cornered sled, except that in most cases only part of the deck is covered and there is a mast and sail. The rear runner is movable so that it may be employed as a rudder. The sail is manipulated the same as on any small boat. A long stretch of good ice is needed to make satisfactory use of an ice-boat. When the wind is strong the boats may attain a speed of sixty miles an hour, and a lot of "ground" can be covered in a short time. Beginners had better stay at home on very windy days, as the great speed and the tipping of the craft make accidents easy. Often it is necessary for one occupant to hang far out over the side of the boat in order to balance it. Irregularities in the ice may make steering difficult, and quick manipulation of the sail may be necessary to avoid capsizing.

All this sounds as though ice-boating were very dangerous, and so it may be at times; but if one avoids very windy days and daredevil stunts it is perfectly safe and most exhilarating. It takes one out into the cold fresh air when most people are inclined to stay inside. The speed and the wind created by it are also very stimulating, especially to breathing and circulation. Much more exercise is secured from ice-boating than one would imagine. The steering, the manipulation of the sail and the bending of the body to assist in maintaining balance often require considerable exertion. The more wind and the greater the speed, the more exertion required to keep the boat under control. As a constitutional exercise ice-boating is very good, but only those with steady nerves should indulge in it.

It is too stimulating for those lacking nerve-energy. Of course, it can be graduated to a large extent to meet the needs and desires of different individuals, and if started gradually anyone in reasonable health can go ice-boating with benefit. After a season of regular outings one will find oneself possessing more strength, energy, endurance and ambition. It is guaranteed to give a good appetite, so that fat people might well avoid it unless they have good will-power.

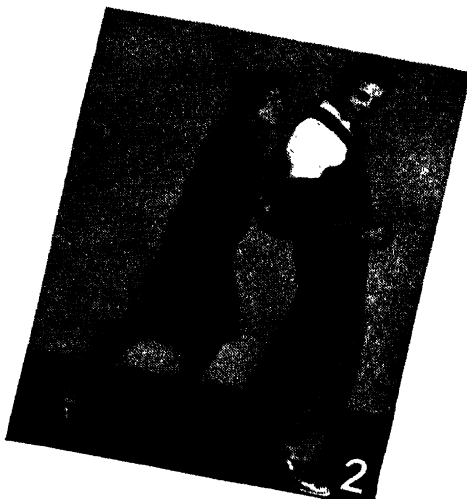
A variation of ice-boating is found in the use of the "scooter." This is a combination water-boat and ice-boat. It is built much like an ordinary sloop, but is equipped with curved runners so that it can glide up on the ice from the water and back into the water again from the ice. It is designed for use in those localities where stretches of ice may alternate with stretches of open water. The health advantages of the scooter are the same as those of the ice-boat, and both are to be recommended in these modern times when people are so much inclined to stay within doors in their artificially heated houses when the temperature is low outside.

ICE-SKATING.—See *Skating on Ice*.

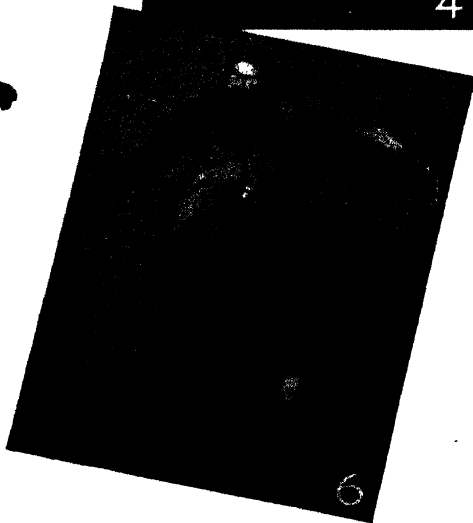
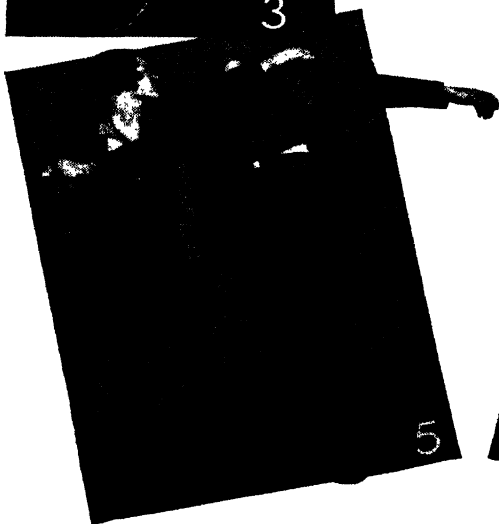
JAVELIN-THROWING.—See *Weight-throwing*.

JIU-JITSU.—Jiu-jitsu is essentially a method of self-defense without regard to what happens to one's opponent, and strictly speaking it should not be classed with sports and athletics. Many jiu-jitsu tricks are designed to dislocate joints, break bones, or throw an opponent so violently as to render him unconscious, and this can hardly be called sport. Of course, boxing and wrestling are more or less punishing sports, but it is seldom that a contestant receives any real injury. But in spite of this factor of violence in jiu-jitsu, it is included here because everyone should learn as much as possible of the various forms of self-defense, and in learning this particular one the pupil will develop considerable strength and endurance and much initiative, courage and determination, thereby increasing his health and his chances for success in life. Jiu-jitsu is especially important for women, since it enables them to defend themselves against a considerably larger and stronger antagonist. The movements, which require speed and skill more than anything else, are also adapted to woman's natural characteristics. With a thick

Speed and
Skill in
Jiu-Jitsu



JIU-JITSU
The aim is to apply one's strength to parts of an antagonist which are weakest and least capable of resistance. It is not a system of muscle building but a means of combating powerful muscles with skillful maneuvers. (See next page for description of holds.)



HOLDS IN JIU-JITSU. (For description of illustrations see following page.)

JIU-JITSU

1. An effective method of defense when attacker wears ordinary clothing. Seize the lapels of attacker's coat and pull that garment down about his elbows, thus pinning his arms and preventing him doing any damage.
2. An even more effective variation of the defense shown in Exercise 1. Seize one lapel of the coat only—the right with the left hand or the left with the right hand, pulling the coat down as before while swinging around behind the attacker. Then seize the other lapel over the shoulder and pull the coat down as illustrated.
3. The attacker in this picture has tried to seize or strike the girl but she has caught his striking hand by the fingers, bent them back and out as far as possible, while maneuvering her free hand under and between his arrested arm to catch and support her engaged wrist. All possible force is used in bending back the fingers so that wrist and elbow will also be bent and attacker thrown off balance. He can often be thrown to the ground at the conclusion of the movement, especially if tripped with one foot.
4. Another method of overcoming an attacker by the lapel hold is not to draw down the coat over the shoulders as in Exercise 1, but to drag the attacker towards you, at the same time administering a solar plexus blow with your knee or foot. Using the foot instead of the knee enables the attacked party to kick the attacker away after striking the blow.
5. When one is attacked as in 3, instead of bending the assaulting hand as there described, seize by the wrist with your right and pull it towards your right so as to turn attacker and get partly behind him. At the same time swing the rigidly held free arm forcibly up under his chin which is forced back as far as possible, throwing attacker off balance and if possible to the ground.
6. To meet attacker's rush, duck under his outstretched arms and sidestep to the right. As you go under the attacker's left arm, seize the wrist with your right, drawing the arm over your shoulder and at the same time grasp the attacker by the throat with the free hand, compress the throat forcibly and choke him into submission.

mat to break the falls the various movements may be practiced without danger of injury to either contestant. The many vaudeville acts featuring jiu-jitsu are sufficient proof that it may be adapted to the requirements of safety. The Japanese are the originators of jiu-jitsu, and the greatest experts are usually found among the members of that race. However, anyone who is willing to practice can attain considerable skill.

Jiu-Jitsu
as Exercise

Jiu-jitsu gives one all-round exercise; yet it is well to practice calisthenics for some time before taking it up. This will develop some strength and endurance, but especially suppleness, which is very important, and will tend to prevent any strains or sprains at the beginning of the lessons. Each



Jiu-Jitsu Holds. Having caught an attacker's wrist with your left hand (picture at left), and forced it back, release hold and quickly pass your left arm under his, forcing the forearm back and up as illustrated and pressing the shoulder down. The right arm is then free to counteract any trick of the other party, or to apply punishment to his head. Another method of meeting an attack (picture at right) is to try to seize the attacker's fingers, one or two will do, and bend them forcibly backward as far as possible. This will make him partly turn his back to you and double him up with pain. The nearer you bring his fingers to the shoulder, the more will he be at your mercy. At the same time your other hand is free for further offense or defense.

movement of offense or defense should be carefully practiced alone and with an assistant before taking part in any bouts. The movements should be performed slowly until repetition makes them automatic, after which one may concentrate on speed. In order to retain any skill developed it will be necessary to practice regularly, for one must be a good judge of distance and very quick to act, and these faculties are soon dulled by lack of practice. However, one will not find this continued application monotonous, as any sport requiring skill is always interesting. While skill is undoubtedly the important element in jiu-jitsu, strength, especially of the hands, is also necessary. For this reason it is well to take some special

Technique
in Jiu-Jitsu



JIU-JITSU HOLDS FOR PROTECTION

A good method of protection against a left arm attack (picture at left) is to seize the attacker around the upper part of the arm, and grasp the back of his coat as here illustrated, throwing your weight against the arrested arm and bending the attacker backwards off balance after which he may be tripped and thrown. Natural defense against the ordinary right hand blow (picture at the right) is to seize the wrist of the striking hand and force it back while twisting it away from you. Or just hit it back sharply and employ any of the movements previously described and illustrated, and if possible treading heavily on his instep at the same time.

exercises for developing the grip. See *Developmental Exercise*.

Most jiu-jitsu contests are conducted in a costume consisting of full length tights and a canvas blouse with rather full sleeves. The blouse permits the securing of various grips and accustoms one to handling a person with clothes on. However, jiu-jitsu can be practiced in nothing but short tights, as in the case of wrestling. The heavy mat already mentioned is essential to safety. A contest usually starts with opponents facing each other, legs spread well apart and each man grasping the sleeves of his opponent's blouse just above the elbows. A "fall" consists in securing any grip which places your opponent entirely at your mercy, or in throwing him in such a manner as to temporarily disable him. This makes it very important that all contestants be in the best possible physical condition, so that recuperation may be rapid. The Japanese have a regular system of training for hardening the entire body, in which are included diet and all right habits of living. By this system it takes four years to become an expert, but of course a great variety of movements are learned.

It is difficult to explain in writing the jiu-jitsu grips, but the illustrations will give the reader an idea of some of the simpler ones. If really interested it is well to seek a personal instructor. One must have someone to work with anyhow, and if the opponent is an expert so much the better. This will enable one to learn more quickly and perfectly. In taking part in special bouts it is important to be quick and decisive and to apply the grips with all the power at one's command. Any hesitancy will give one's opponent a chance to counter.

Kinds of Jumping

JUMPING.—There are many kinds of jumping, but a jump is always a leap into the air, requiring strength in the legs, concentration and intense effort. The two most common jumps are the running-broad and the running-high. There are also the standing-broad and standing-high, the hop, step and jump, and pole-vaulting. Pole-vaulting will be considered under its own heading. We have already discussed hockey and hurdling, both of which include some jumping. Jumping, or leaping as it was then called, was included in the pentathlon of the original Grecian Olympic games, and is so included today.

Jumping is not in itself especially valuable for the health. It is too much of a sudden, tense effort. However, in order to be a good jumper one must go through a regular training schedule, and this is always health-producing. The best jumper will not be the man with the longest or the strongest legs, but the one with the most energy and the best technique. This means that if one desires to make records one will have to eat correctly, get plenty of sleep, practice sprinting to develop speed, take longer runs to develop endurance, special exercises to strengthen the legs, and general exercise for the rest of the body, in addition to practice in actual jumping. The usual training schedule calls for jumping only two or three times a week, with three or four days' rest before competition. Jumping really uses health and strength, instead of producing it, but if one trains properly the general condition will certainly be improved. The ability to jump well will then be in the nature of a reward for right living.

Health Value
of Jumping

The ground must be specially prepared for jumping. The "take-off" for the broad jump consists of an eight-inch joist sunk to the level of the ground with the earth cut away on the farther side. Some distance beyond this the earth is dug up loosely to make a soft spot for landing. The same take-off is used for the hop, step and jump, but is not necessary for the high jump. For the high jump a special standard consisting of two uprights and a cross-bar is needed. The bar



PHOTOGRAPH UNDERWOOD & UNDERWOOD

The running-broad jump requires speed and once in the air the distance one moves depends absolutely upon the horizontal speed, as a matter of physics.

is adjustable for height and is not attached to the uprights, but rests on pins so that it will be easily displaced if touched by the jumper. The uprights are placed 12 feet apart. A line is drawn 3 feet in front of the standard, which is known as the balk-line. Stepping over the line constitutes a balk and two balks count a trial. Three trials are allowed for all jumps. The technique for the various jumps is as follows:

**Running-
broad Jump**

Running-broad jump.—There is no definite distance to run in order to gain momentum for the jump. This is a matter of individual preference, but as a rule only 8 or 10 steps are taken. The distance should be enough to develop speed, but not enough to waste energy. The running steps should be measured and a marker of some kind placed on the ground at the proper distance in front of the take-off, so that the jumper will be sure to hit the exact spot with the foot from which he wishes to jump, usually the right. Speed is the important thing in the broad jump. One is not aiming for height but distance, and once one is in the air the distance traveled will depend upon the momentum of the run. The height of the jump does have some effect on the distance achieved, however, and it is well to get up as high as possible without thinking too much about it. Upon jumping it is well to draw up the knees, even as high as the chest, while keeping the body and arms extended well forward. This lessens wind resistance and gives one the benefit of greater height than has actually been achieved. The legs are straightened again just before landing. Good form is always important, and it is well to practice this control of the body, without trying for distance, until it becomes second nature. At the same time one should practice sprinting starts and runs in order to develop speed and build up the leg muscles. As broad jumping is rather hard on the knees, jumping for distance should not be practiced more than once or twice a week.

**Standing-
broad Jump**

Standing-broad jump.—For this jump there is no preliminary run, but the jumper stands with both feet directly on the take-off. The toes may extend over the board just enough to give a good purchase for the jump. Starting position is with arms overhead, body leaning slightly forward and knees slightly bent. Then a deep breath is taken, the arms are brought forcibly down to the sides and the legs are straightened

in the jump. After leaving the ground, the legs are drawn up, as in the running-broad jump, and the arms are extended forward. When the legs are again straightened to land it is important to keep the arms straight forward, so as to balance the body and avoid falling backward. In training for this event special exercises for developing the leg and abdominal muscles are helpful. It is also well to practice mental concentration, for in this jump all the energies are combined for one great effort, and concentration is essential.

The running-high jump.—This jump does not require the speedy running necessary for the broad jump. Just a few easy steps to enable one to develop a good spring and enough momentum to carry one over the bar will be sufficient. The attention is concentrated chiefly on achieving height. However, the idea is not to get the entire body up high enough to clear the bar in a perpendicular position, but to get it up just enough to clear in a practically horizontal position. This is accomplished by throwing the free leg (that from which the jump is *not* made) forward over the bar, at the same time turning the body with the other side down and the other leg doubled up, straightening it as the body goes over, and alighting with face to the bar. It will be seen from this that the important thing is to practice jumping at easy heights so as to develop good form, for until one can control the body in this horizontal position one will not be able to make the six-foot jumps necessary to compete with the best. Special exercises for developing the muscles of the legs will be of further assistance.

Running-
high Jump

The standing-high jump.—This is usually done scissors-fashion. The jumper may stand with either side toward the bar, but should always concentrate both mind and eye on it. Much the same position is assumed as for the standing-broad jump, but instead of jumping forward after the arms are brought down and started up again, the leg nearest the bar is brought upward with speed and snap, and as soon as it has reached its limit the other leg follows, the body being thrown over the bar at the same time. The body may be bent somewhat backward so as to lift the buttocks.

Standing-
high Jump

The hop, step and jump.—As its name indicates, this jump consists of a combination of hopping, stepping and jumping,

in the order named. A preliminary run is taken, as for the running-broad jump. As the contestant strikes the take-off he leaps with all his strength, coming down on the same foot that was used to start the hop. He now takes a step by swinging the other leg forward, and the final jump is then taken from this leg. One should not try too much for height in the hop, as it is too great a strain on the leg. The step should not be so long that there is no spring left for the jump, and it should be finished on the heel so as to get a lift from the toes. More height may be tried for on the final jump. This is a very strenuous contest and requires strength, speed and good form. Exercises for the legs should be taken for strength, and sprinting should be practiced for speed. Twice a week is sufficient to try for distance. Always remember that good form comes first and is essential if one would make the greatest distance in the end.

LACROSSE.—Lacrosse is a ball game played with a solid rubber ball and the “crosse” or “stick,” which is a sort of triangular framework covered with netting. It is supposed to have originated with the Indians and has been played by the white men in this country since it was first settled. The first intercollegiate athletic contest held in America was a game of lacrosse. In spite of being the “early bird,” however, it has never attained the popularity of baseball. It is played in almost all colleges, but not much outside these institutions, except in Canada, where it is considered the national game. Probably its lack of universal appeal is due to the fact that it is a very strenuous game and only those in good condition can play it. It has been called the fastest game on two feet and few people care for such extreme activity.

It would be better if lacrosse were more popular, as it has many health advantages. It is played out of doors without too much clothing, so that the players get plenty of air inside and out. It requires much running and swinging of the arms, thereby developing the heart and lungs as well as the muscles of the parts employed. There is also much bending and twisting of the body, and the constant collisions call for general exertion to maintain balance, so that all parts of the body are used. Lacrosse is thus a strenuous constitutional exercise which builds endurance and firmness of all the tissues. It also

Lacrosse: A
Game of Skill
and Strength

develops courage, initiative, determination and the spirit of cooperation. A properly trained individual, playing regularly, becomes in many ways a "man of iron," who, while he may not have bulky muscles, has everything else.

Only those in fairly good condition should attempt to play lacrosse without preliminary training. Even these should start gradually and give due attention to general health-building measures as well as to the practice of the game. Speed and endurance are very important, and unless one plays much it may be well to practice running, both sprints and middle distances. The next most important qualification is ability to handle the stick and the ball. This is best obtained by practice in hitting the ball up against a wall, catching it in the stick and repeating. In this way speed and coordination are developed.

Lacrosse is not intricate, as the rules are fairly easy, yet it requires much practice, because of the dexterity and endurance necessary. The following outline will give an idea of the game.

Lacrosse.—Equipment.

Lacrosse
Field and
Equipment

The Field: Should not be less than 150 by 70 yards, the boundaries marked with white lines. Another white line is drawn across the center of the field and is known as the off-side line. The goals are placed one at each end of the field, 110 yards apart. They consist of two six-foot uprights with a six-foot connecting bar. A pyramid-shaped netting is attached to the back of the goal-posts to catch the ball. A rectangle known as the "goal-crease," 18 by 12 feet, is marked about the goal. A circle 20 feet diameter is marked in the center of the field. This is the facing-circle.

The Ball: A solid white ball of sponge rubber, 8 inches circumference and $4\frac{1}{2}$ to 5 ounces weight.

The Crosse: This is made of wood and netting. The framework consists of a handle with a triangle on one end, except that one side of the triangle is omitted. The triangle is completed and filled in with a netting of clock string. The whole somewhat resembles a tennis-racket.

Uniforms: Worn for identification, but the only things necessary are gloves to protect the hands.

The Players (Twelve to a team): The *Goal-tender* stands in front of the goal and the rest are lined up in the following

order: *Point; Cover-point; first, second, and third Defence; Center; third, second, and first Attack; outside Home and inside Home.*

The Game.—The teams line up facing each other with the goal-tenders in front of their respective goals and the centers in the facing-circle. Each man has his left shoulder toward the goal which he is attacking. The game is started by “facing.” The crosses of the two centers are placed on the ground back to back in the center of the facing-circle, with the ball between. When the whistle blows to start play each center attempts to gain control of the ball and start it toward his opponent’s goal by passing it to one of his team-mates. The ball is passed from man to man by carrying it in the crosse, throwing it from the crosse, or, if it is on the ground, by knocking it along with the crosse or kicking it with the feet. The ball must not be touched with the hands, except in the case of the goal-tender, who is allowed to stop it in this manner. As soon as one side gets the ball far enough down the field the member in possession of the ball attempts to shoot it between the goal-posts. If successful one point is scored. Usually the ball passes from side to side and up and down the field for some time before a point is scored. The attack and home members of a team are constantly trying to score goals while the goal-tender, defense and point members of the other team are trying to prevent it. The side scoring the most points when time is up wins the game. The game is played in two thirty-minute halves with a ten-minute rest between. Goals are changed at the end of the first half. After each goal scored the ball is faced again in the center of the field.

If the ball goes out of bounds it may be returned in play by facing it at a point 10 feet from where it went out, or by allowing the nearest player to return it by a throw or a run from where it went out. A team is considered off-side if it has less than three men on the attack side between the center line and the field boundary, or less than three exclusive of the goal-tender on the defense side. Various other technical and personal fouls may be committed. Penalties for fouls include a free throw for the player fouled, or suspension for a limited time, or for the rest of the game, of the player fouling.

LEAP-FROG.—This sport, played out of doors and requiring the use of all the large groups of muscles, is excellent for general health-building, and is classed as a constitutional exercise. It may be made mild or fairly strenuous, but never requires so much exertion that it cannot be played by any ordinarily healthy individual. The constant body-bending and the deep breathing are excellent for constipation. The use of the thigh muscles required for jumping and the body bending materially stimulate and assist the circulation, so that all the functions of the body are improved. Much laughter is evoked by the somewhat awkward positions assumed and by the not infrequent tumbles, and there is nothing like laughter to make one cheerful and optimistic and to influence favorably all parts of the body and mind. Leap-frog is an excellent game to play on the beaches, but it can be recommended for use anywhere and at any time. If it were played more generally there would be less trouble in the world.

**Leap-Frog
as Sport**

The simplest and best form of leap-frog is the continuous running line, in which all take positions with backs bent over, hands on knees or ankles, while the last in line vaults, straddle-fashion, over each one, finally taking his place at the front of the line, while the next one at the end of the line proceeds in the same way until he reaches the front, and so on indefinitely.

A more exacting form of leap-frog is one in which one man is down in a specified position while the others take turns in trying to vault his bent back. A special take-off is provided, a leader setting the position to be occupied by the man who is down. The leader first vaults from the take-off, followed by the others, but he marks the landing place of his rear foot as the place for the man "down" to stand for the next series of vaults. These will naturally be more difficult because of the longer leap. The first one who fails to get over properly, vaulting and placing one hand on the back, must take the "down" position for the next series of leaps. As the "down" man is placed farther and farther away from the take-off the leader may specify one step and a vault, or two steps and a vault, first doing it himself. The objection to this form of leap-frog is that the poorest jumper gets the least practice, being down most of the time.

MEDICINE-BALL.—The use of the medicine-ball is fully discussed under *Constitutional Exercises*.

MOTORCYCLING.—See *Cycling*.

MOTORING.—In the old days motoring was a real sport, because it took a “good sport” to take a chance on the unreliable machines and to put up with the constant necessity for making repairs and changing tires. Under present conditions, however, motoring is little more than a means of locomotion. Racing may be considered a sport, but from the health standpoint it cannot be recommended as it is too exciting and is a test of endurance and condition rather than a builder of these qualities.

**Motoring
and Health**

In spite of the fact that little can be said directly for motoring as a health-builder, it does have a number of indirect effects in promoting the well-being of the motorist. First of all it takes him out into the open air and gives him frequent changes of scene, all of which is valuable in promoting a cheerful frame of mind. Motoring has considerable fascination for most people and helps to keep them away from indoor games played in smoke-filled rooms, and from too much indoor life in general. The possession of a motor-car makes it easier to indulge in many forms of athletics, and thus encourages these valuable recreations. Golf clubs could hardly exist without the automobile. Many people who would formerly have stayed at home now go swimming, because the car makes it easy and convenient for them to do so. Interest in outdoor camping has also been stimulated by the automobile. To convalescents an automobile ride is often a great benefit.

So motoring, if intelligently employed and used as an adjunct to more active forms of sport, may be considered a healthy asset.

**Training for
Vaulting**

POLE-VAULTING.—The pole-vault is a jump assisted by a pole. This enables one to attain much greater height than would be possible unaided. The present record is well over thirteen feet. Such vaulting is naturally attended with some danger, as a drop from a height of thirteen feet must be correctly managed to be safe, and there is the further possibility of the pole's breaking. However, injuries seldom occur, as the poles are specially made for the purpose and the ground is well broken so as to be soft for landing. While pole-vaulting

is classed as a jump, it really requires as much strength in the arms and upper-body as it does in the legs, so that one gets more all-round exercise from it than from other jumps. The health value of pole-vaulting, however, is about the same as that of other jumping. It is the training for pole-vaulting which is valuable rather than the actual vaulting, which merely utilizes the benefits of the training.

The standard used for the pole-vault is the same as for the *high jump*, except that it is higher. The pole may be of any size and weight desired, this being left to individual preference. It is, of course, most important that it should be heavy enough to bear one's weight without danger of breaking. It may be wrapped with tape to assist in maintaining a firm grip, and it is permitted to dig a hole at the take-off in which to plant it. The balk-line is drawn 15 feet in front of the bar, and the same rules as to balks and trials apply as for the high jump.

Before starting to make the jump, the vaulter measures the height of the bar with his pole, placing his right hand slightly above this point and the left lower down. The hands should be placed far enough apart to permit balancing the pole while carrying it during the preliminary run, but not so far as to interfere with getting a good upward pull as the body goes up. The position of the upper hand cannot be changed after the body has left the ground. The lower hand can be changed as long as it is not placed above the other, and usually it is well to shift it slightly upward from the original grip. Having gripped the pole, the vaulter takes position to start his run, holding the forward end of the pole somewhat higher than the head so that the downward swing of the pole will help the upward swing of the body.

Technique of
Vaulting

It is best to make two marks, one about 50 and the other 100 feet from the take-off, so that the run may be properly gauged. The distance and speed of the run will depend upon the individual, but great speed is not necessary. The purpose of the run is to give one sufficient forward momentum to carry the body over the bar. The upward lift of the body is accomplished mainly by the pole and the upward pull of the arms and does not depend much upon the momentum of the run, though the higher the vault the more momentum will

be required to carry one over. At the conclusion of the run the pole is planted in the ground and the leap made. The vaulter should leave the ground just as the pole enters it, in order that the whole action may be smooth and strain upon pole and man avoided. As the body leaves the ground it is pulled upward and the legs are swung forward and upward higher than the head, so that the vaulter shoots over the bar feet foremost. This requires action of the arm, chest and abdominal muscles more than of the legs. As the body goes over the bar the pole is released with a backward cast so that it will not hit the bar, and the arms are raised upward so that they too will clear the bar. The body turns during the vault, so that it alights facing the standard.

From this description of the vault it will be seen that training should include some special exercises for developing the arm and body muscles, as well as running for strengthening the legs and building endurance. One must be able to handle the weight of the body easily with the arms, and to lift the legs by the strength of the abdominal muscles while hanging suspended from the arms. When able to do this, practice in vaulting at a moderate height may be started, so as to develop good form, while continuing the strength-building exercises. After the proper form has become "second-nature," one may try for height. In training for most athletic events it is not advisable to try to do one's best very often, outside competition; but in pole-vaulting, once one has obtained the proper technique, it is well to jump somewhere near one's best whenever practicing, in order not to lose the full upward pull with the arms. However, the actual vaulting is not practiced more than three times a week, the rest of the time being devoted to general training. A good all-round development is necessary for pole-vaulting.

P O L O.—Polo is a strenuous and to some extent dangerous equestrian game. It is full of excitement, and among those interested in horses and riding is quite popular. It is a very ancient game, records of such a sport going back to before the Christian era. It is supposed to have originated somewhere in northern India, and was introduced into England late in the nineteenth century by army officers who had been stationed in India. From there it reached the United States.

At present it is played mostly by the army and a few wealthy clubs. The equipment required is so expensive that few are in a position to play it, so it is not necessary to go into any detailed description of it.

The general object of the game is similar to that of field hockey in that the efforts of the players are directed toward knocking the ball between the goal-posts. As it is played on horseback, the field must be quite large, usually 300 by 150 yards. The goal-posts are placed at each end, 24 feet apart. The number of players is limited to four on a side in order not to give too much chance for mix-ups. The positions are numbered 1, 2, 3 and 4. The players are mounted on special ponies bred and trained for the purpose. Each player is equipped with a mallet about 4 feet long with which to hit the ball. Team-work, both for interference and assistance, is important. The team scoring the most goals wins.

Polo and
Hockey

While polo is played on horseback, it is almost as strenuous for the riders as for the horse. The sudden sprints and stops, dodging, leaning from side to side, swinging at the ball, etc., require a high degree of strength, endurance, coordination and especially nerve. Every player must be an expert rider and well acquainted with his pony. Even with the best of preparation, however, upsets are not infrequent.

For anyone who can afford the equipment and the time polo is certainly a highly interesting form of all-round exercise that will develop the limbs and trunk and increase flexibility and endurance.

POLO, WATER.—Water polo is quite different from equestrian polo. It is even more strenuous, as the players have to do all the physical work. It is a game which employs every muscle in the body and is excellent for building endurance. Only a good swimmer can play water polo, and no one should attempt to play it without being thoroughly accustomed to the water, and also in good physical condition. It is necessary to be able to swim rapidly, to change strokes and to turn about in the water with ease; to have perfect control of the breath and the temper; and to be able to maintain maximum exertion for minutes at a time. Good heart and lungs are very necessary. All who desire to play should spend plenty of time practicing the crawl and the trudgeon strokes,

swimming on the back, swimming under water, treading water and breathing. No one who is afraid of being "ducked" should attempt this game, and it should be played only when the stomach is empty.

From the health standpoint water polo is a most excellent game. It combines exercise with deep breathing and cold bathing. When played out of doors it also includes fresh air and a limited sun bath. It builds resistance to cold as well as general strength and endurance. Those who play regularly may expect to reach the peak of physical condition if they live rightly in other respects. Some claim that water polo has no peer as a sport.

Water Polo
and
Endurance

Water Polo.—Equipment.

The Pool: May be indoors or outdoors, preferably the latter. If a large body of water is used the boundaries must be roped off. The size may vary from 50 to 100 feet in length and 20 to 50 feet in width. A medium-sized pool is generally preferred. The goals are at each end and vary from 4 to 9 feet in length and 1 to 3 feet in height. The American game calls for the smallest-sized goals.

The Ball: Round, air-inflated, rubber ball, 25 to 28 inch circumference. The Americans use this only three-fifths inflated while the English and Canadians use it fully inflated.

The Players.—(Six to seven to a team): When seven play these include a *Goal-keeper; right, center and left Backs; right, center and left Forwards*. When six play one of the *Backs* or *Forwards* may be omitted.

The Game.—There are several methods of playing the game, the European, the Canadian and the American. The first two do not differ greatly, except that in the European form seven members comprise a team and the ball cannot be held under the water, while in the Canadian six players make a team and the ball may be held under the water. The general method of playing the game is as follows: The teams line up at each end of the pool. At a given signal the referee tosses the ball into the center of the pool and the players dive and race for it. Thereafter each team, except the goal-keeper, whose job is wholly defensive, endeavors by throwing and pushing the ball to advance it toward the opponents' goal. The ball is played rather than the player, and only one hand at

a time may be used. Deliberate splashing in an opponent's face is prohibited, but while the rules for the protection of the player are being made more strict there is still plenty of "ducking." The game is played on time, either in halves of seven to ten minutes, or in four quarters of five minutes each. The team having made the most goals when time is up wins.

**Water Polo
in America**

The American method of playing the game is to use the ball only partly inflated and to advance it entirely by pushing, with only an occasional throw. A goal is scored by holding the ball against the goal "mark" instead of throwing it between goal-posts. Two players cannot tackle one man, but a player can duck an opponent when within four feet of the ball. This method of playing is livelier, more strenuous and more interesting, but not quite so scientific.

PUSHBALL.—Pushball is aptly described by its name, for it consists in pushing a ball, the largest ball used in any ball game. It is a rough-and-tumble game suitable for large groups of boys or young men. There is no science to the game, as it is all pushing, and victory generally goes to the side which is strongest and heaviest. No practice or training is necessary to participate in the game, but no one should attempt it who is not sufficiently tough to withstand a goodly number of hard knocks.

**Pushball, for
Constitutional
Exercise**

Pushball is played out of doors and has the usual health advantages of fresh air and general muscular activity. All the muscles are used, but those of the legs, arms and front of the body are especially affected and considerable development of these parts may be brought about. However, pushball is essentially a constitutional exercise, though of the strenuous variety. It has a general toughening and hardening effect, building endurance.

The game is played on a football gridiron or any similar field. The ball used is 6 feet in diameter and consists of a leather-covered rubber bladder which is pumped up with air. It bears considerable resemblance to a gigantic volley-ball. Any number of players can take part, though there should be an equal number on each side. The object of the game is to push the ball over the opponents' goal-line. The ball is started in the middle of the field and each end of the field is a goal. All cannot push the ball at once, but they can push

each other, thereby backing up those in front. If those near the ball can raise it above the ground by the united efforts of several players so that it can be rolled over the heads of their opponents, better progress will be made.

The game is played mostly at colleges, as few other groups can afford the expense of a ball. At those institutions push-ball is often substituted for the old style class "rushes." There is much pushing and squeezing, the type of primitive scuffle which is enjoyed by young men and is one of the most natural forms of play or exercise.

**Quoits for
Exercise**

QUOITS.—Quoit-pitching is quite an old game, its origin being more or less shrouded in mystery, but it has never attained the popularity and wide-spread use of its plebeian relative, horseshoe-pitching. This is probably because horseshoes were always available but quoits were not. Anyone could drive a peg into the ground, get a couple of old horseshoes from the blacksmith and start pitching. The horseshoes afford just as much enjoyment and are just as useful for health purposes as quoits, and as ordinarily played the two games are the same. However, the modern official game of quoits must be played according to certain rules and on a special rink, so that it has attained a dignity unknown to horseshoe-pitching.

The game of quoits is only a mild constitutional exercise, its health value resulting chiefly, when it is played out of doors, from the fresh air and mental diversion obtained. It does use most of the large groups of muscles, but not at all strenuously. Playing a number of official games in a tournament may call for some strength and considerable endurance but one would have to do a lot of quoit-pitching to develop these qualities from the game alone. If one wishes to excel at the game, therefore, it is well to take other general exercises for building strength and to give due attention to every phase of right living so as to maintain the nerve-energy at par. Quoit-pitching requires poise, coordination, courage, and good eyesight, and all these depend greatly on the supply of nerve-energy. Thus it will be seen that while quoit-pitching does not give one much exercise, it does have many qualities which recommend it for the development of health and character.

Quoits.—Equipment.

The Rink: For the official game a piece of ground at least 30 yards long, to allow plenty of room in addition to the 18 yards between the pegs. In the unofficial game the pegs can be driven at variable distances. Ten yards is sufficient width. Around each peg, in the official game, is a three-foot circle filled with clay which is kept moist so that the quoits will sink into it and maintain their positions.

The Pegs: Iron pins, 1 inch diameter and up to 40 inches length. They are driven into the ground until only the head protrudes.

The Quoits: Circles of iron from $4\frac{1}{2}$ to 6 inch diameter and from $1\frac{1}{2}$ to 3 pound weight. They always come in pairs, as each player uses two. Quoits are also made of hard rubber, loaded so that they will not slide or roll, and special sets of wood, cane or gutta-percha can be obtained for indoor use. Each player uses the size and weight that suits him best.

Quoit-
Pitching

The Players.—Quoits may be played individually or with two on a side. When two play, one member of each team stands at each end of the rink. After the players at one end have pitched, the others take their turn. When playing individually the contestants change ends after each pitch.

The Game.—There are a number of variations in the rules governing the game of quoits, depending on whether it is official or non-official and whether it is played in America, England or Scotland. However, the fundamental principle is always the same. The players stand at one end of the rink near the peg and pitch their quoits toward the other peg, making every effort to come as close to it as possible. The quoit coming the nearest to the peg scores. In the ordinary game in America the nearest quoit scores one unless it encircles the peg, when it beats all others, unless dislodged, and counts two; but in the official game the quoit which has some part nearest to the peg, whether or not it encircles it, counts one and no other quoit scores. The side making 61 points first wins, but in the ordinary game a lesser total is required, generally 21 points. In England a player can score two points if both his quoits are nearer the peg than either of his opponent's quoits. Thus it will be seen that when playing the game for amusement the players can decide on the scoring to suit themselves. No matter which particular rules are used,

the health value will be the same. In some parts of the country there is sufficient interest in the game to warrant holding tournaments every year.

Open Air
Roller-
skating

ROLLER-SKATING.—This form of sport has much to recommend it when practiced under good conditions and especially out of doors. An indoor rink where there are crowds of people and clouds of fine, almost invisible dust, with very little fresh air, cannot be recommended. One should skate outside, or on a rink where the sides can be completely opened to admit a good supply of air. When thus practiced roller-skating gives one good constitutional exercise which is a cross between walking and running, being somewhat more vigorous than the former but less so than the latter. Fancy-skating requires more exertion, more muscular control and greater concentration, and is especially valuable. By varying the speed and form of skating it can be adapted to the needs of the weak as well as the strong. Even mild ordinary skating requires deeper breathing than usual, and this is an added advantage. The arm and body muscles are used more than is apparent. Roller-skating is by no means exclusively a leg exercise.

Kinds of
Skates

There is only one kind of skate that is used to any extent at present and that is the steel-wheeled, ball-bearing kind, attached to the feet with straps or clamps or both. The first skates had wooden wheels, but these were hard and did not wear well. Then followed wheels made of a compound popularly known as "blood and sawdust," which were more resilient and more silent, but still did not wear well. Then came the steel wheels with ball-bearings, and while these wear excellently and run easily they are noisy and produce much vibration. If some of the large tire companies would bend their energies toward perfecting a rubber wheel or tire for the roller-skate, as they have for the automobile, there might be a great revival of this sport. It is an interesting one, and with the good roads that we have nowadays the skates might even become an important means of locomotion. The rubber tire would take away the vibration and the noise, and the ball-bearings have already made possible great speed with little exertion. People could get about much faster with no more exertion than they now make in walking. Such skates are already used to a limited extent in large business organizations.

as equipment for messenger boys, but no attempt has been made to popularize them for general use. Probably the automobile has too strong a hold, and will always be a more popular means of transit than one calling for considerable exertion. Thus do people, through laziness, give up their health.

No particular technique is required for ordinary skating. One can learn to maintain balance and control one's motions with very little practice, and it is not long before one feels just as much at home on the skates as without them. A smooth easy stride should be cultivated, taking advantage of one's momentum. Tension is never advisable. Running on the skates when trying to make speed only results in a waste of energy. When trying to skate fast, toe straight forward, give yourself a chance to roll, and you will get a driving motion that will be hard to beat. It is well to do some fast skating occasionally, both for the increased exercise and the added experience in handling the skates when quick action and quick thinking are necessary.

Roller-skating is by no means a complete system of exercise in itself, but when used as a part of the general regimen it will be found very helpful. *Ice-skating is more beneficial*, but the opportunities for indulging in it are limited, so that roller-skating has its place and is worthy of more attention than it at present receives.

Possibilities
in Roller-
Skating



Rope-skipping. Many steps, single, double, forward, backward, sideward, etc., may be used in addition to the plain run or hop. See text for details. Rope-skipping is excellent for improving circulation, breathing, and intestinal peristalsis.

ROPE-SKIPPING.—Many people consider rope-skipping a children's game and would be afraid to practice it in public for fear of what the neighbors would think. As a matter of fact rope-skipping is an important part of a boxer's training, being a valuable exercise for anyone who is not afflicted with prolapsus of the abdominal or pelvic organs. And when it comes to health-building one should not consider what the neighbors think. Rope-skipping is not merely jumping a rope, but includes quite a variety of foot movements, which lend interest and value to the exercise. It can hardly be called a sport, perhaps, but is included here because it can be used for recreation.

Rope-
skipping
for Adults

Rope-skipping has practically all the health value of running and jumping, with the added advantage that it can be done anywhere in a small space and with no equipment but a rope. Many people are not so situated that they can run regularly out of doors, but anyone has space enough for skipping a rope. Of course, the place where it is practiced should be well ventilated. The constant up-and-down motion gives one a thorough shaking up, something that most people need badly in these days of sedentary occupations. The use of the large thigh muscles powerfully stimulates the circulation, and this in turn quickens the respiration. Deep breathing cannot be avoided when skipping the rope. Because of these effects, this is a splendid exercise for building endurance. Considerable strength can also be gained by varying the leg movements, so as to use some of the trunk muscles. The effects are constitutional in character, but one would not greatly lack development if one took no other exercise. However, it is always best to take different kinds of exercise, as has already been explained.

When skipping the rope it is best to wear a minimum of clothing. The feet can be bare, or a tennis or gymnasium shoe can be worn. Even bedroom slippers will answer if nothing else is available. The rope should be long enough to make a loop that will pass easily over the head or under the feet, but not so long as to drag or be in the way. The ends of the rope can be wrapped round the hands, or special wooden handles may be attached. At the start, while the feet are being strengthened, it will be best to jump on the earth, or

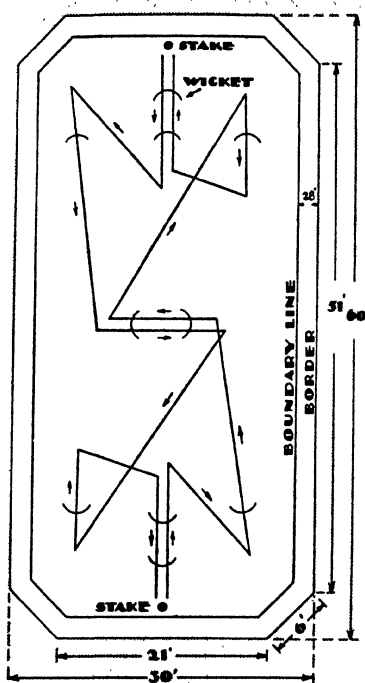
on a mat. If necessary to jump on a hard floor, it will be advisable to start more gradually than would otherwise be necessary. If not accustomed to jumping, one should not skip the rope until tired the first day, as the feet may be strained before the legs tire. If one has any special foot weakness, it will be well to take some corrective exercises before trying rope skipping. A few exercises for the feet can be taken to advantage in any case, and cold foot-baths will help to harden them.

Rope-skip-
ping for
Endurance

Begin the jumping slowly, and use the simpler movements until accustomed to swinging the rope and timing it with the jumps. Keep the wrists limber, but put enough snap into the swinging to keep the rope more or less taut. Simple running movements should be used first, hopping on one foot and on both feet and alternating the two; also hopping twice on each foot before changing to the other. When these can be done easily and one has gained a sense of rhythm, the following may be added: Kick forward with a running motion; same to the rear and to each side; hop on one foot, swinging the other leg forward and backward several times before changing to the other foot; raise the knees as high as possible while doing the running movement; kick up behind as far as possible while running. When kicking or jumping to the side, hold the arms out well so as to spread the rope. Variations of these moves can be devised after a little thought and practice. This will add mental interest to the exercises and make it much more beneficial. Usually it is well to end up a period of rope-skipping by running in place quite rapidly, but gradually slowing down when one is ready to stop. If convenient one can run around in a small circle. Never carry the jumping to the point of great fatigue or breathlessness. Take a few exercises lying down in addition to the jumping.

Contraindications for this form of muscular activity are prolapsus of the stomach, intestines, kidneys or pelvic organs, and pregnancy.

ROQUE.—Roque is the scientific form of croquet. It has reached such a high state of development that it is as scientific as billiards. Special courts and equipment are required to make play accurate, and as a result a club is usually formed by a number of players interested in the game, so that the



Plan and dimensions of the official roque court, showing the positions of the stakes and wickets and the direction of play.

expense may be distributed. Many of the larger cities have such clubs, there is a National Association and frequent contests are held although the game is by no means as popular as tennis or golf.

The health value of roque is similar to that of croquet, but for those lacking in nerve-energy the latter is the better, because roque requires much concentration. But of course the degree of keenness of competition determines to a large extent the amount of nerve-energy required for and expended in any game.

Those desiring to excel in roque must have good eyesight, fine coordination and perfect control of the nerves. Hence all health-building measures are of value, with special need for relaxation and sleep. Practice is the only thing that will make one expert in the various "shots," but in a game, unless this expertness is backed up by nerve and staying power, the less experienced but healthier and stronger player will be likely to win.

Roque.—Equipment.

The Court: A level piece of ground, scraped, rolled and sprinkled with fine sand, 60 by 30 feet. The corners are cut off by triangles with base (hypotenuse) 6 feet long, and a border about 4 inches high encloses it. This may be of wood or cement faced with hard rubber. A boundary-line is drawn parallel to and 28 inches inside the border.

The Stakes: Round wooden sticks, 1 inch diameter and extending $1\frac{1}{2}$ inches above the ground. Placed at each end

of the court, in the center and just clear of the boundary-line.

The Wickets: Steel arches, 10 in number, $3\frac{1}{2}$ inches wide and extending 8 inches above the ground. Often set in blocks of wood beneath the ground so as to make them rigid. They are placed around the court in the manner illustrated, and painted clips or markers are provided for them.

The Balls: Round, solid spheres of hard rubber, $3\frac{1}{4}$ inch diameter. They are painted red, white, blue and black.

The Mallets: Made of wood and variously decorated. There is no standard mallet, each player using the size and weight which he likes best. In most cases the head of the mallet will be 7 or 8 inches long and 2 inches in diameter, banded with metal and having one end finished with soft rubber.

The Players.—The official game of roque is always played individually with one man on each side. Each man uses two balls.

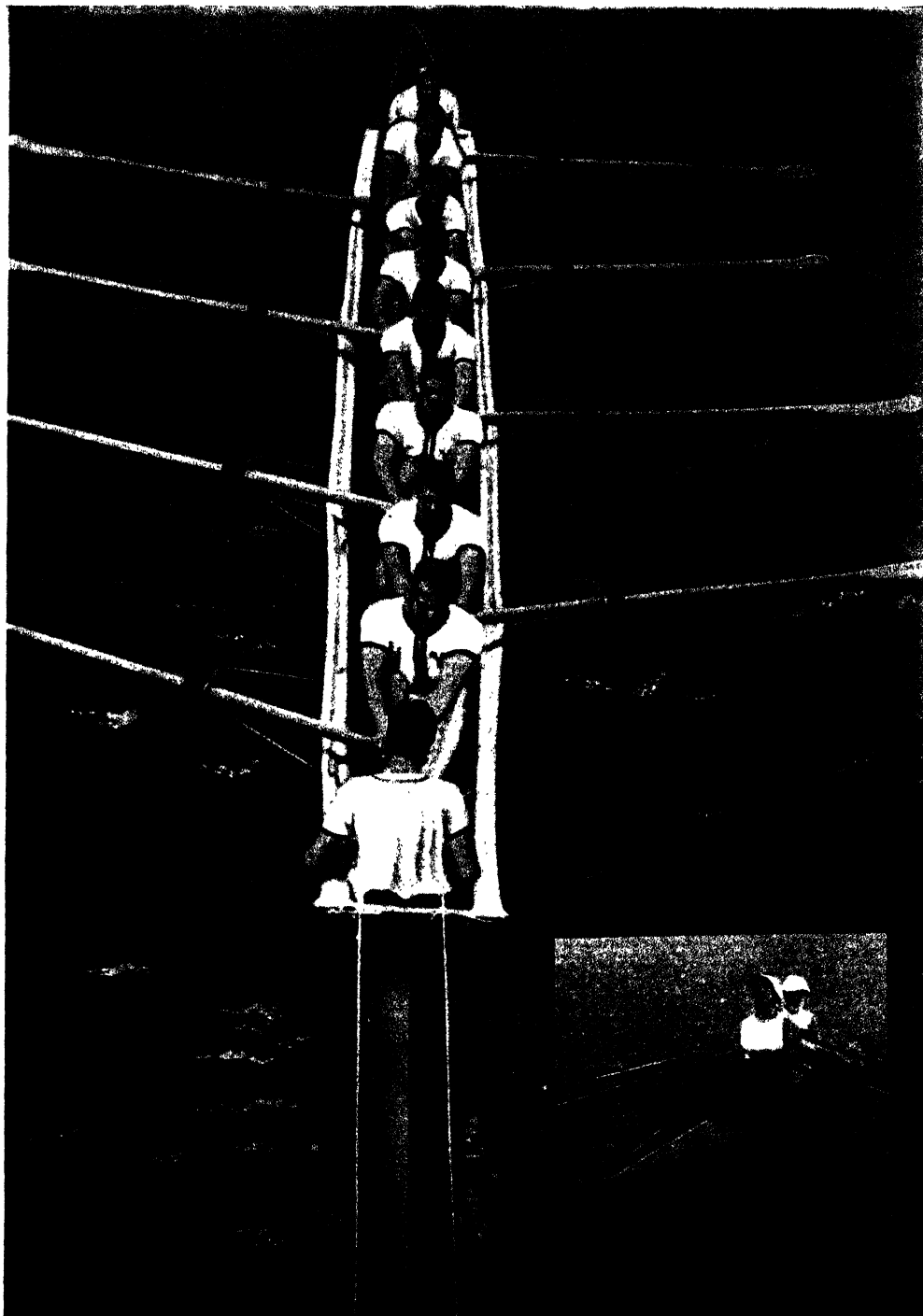
The Game.—The object of the game is similar to that of croquet; that is, each player strives to drive his balls through all the wickets in a prescribed direction and back again to the starting-stake in the shortest possible time. The player who succeeds in doing this first wins the game. The game is started by placing the balls in the four corners of the court nearest the center, the partner balls being diagonally opposite each other. The balls are always played in the order red, white, blue and black, but any color may open the game. The first player attempts to drive his ball so as to hit one of his opponent's balls and thus get another shot to place his ball near the first wicket through which he must pass on his round of the court. Each player places a marker on the wicket for which he is playing and after he passes that wicket the marker is moved to the next one. Players may hit any other ball on the field once before making a point, and having hit it they are said to have counted upon it. After counting on a ball the player must "take play" from it. This is done by picking up the ball being played, placing it against the ball that was hit and then making a "slice"; that is, hitting one's own ball so as to advance it and at the same time make it drive opponent's ball into a disadvantageous position. After taking play from a ball the player

is entitled to one more hit before his turn is ended. If he can hit another ball he continues to play as before. If he can drive his ball through a wicket he makes a point and can thereafter play on any other ball the same as when his turn started. If he is playing for a stake and hits it, he also makes a point and continues as before, unless hitting the stake finishes his game. Thus a player continues to play as long as he makes a point or counts upon another ball. Having gone down the court to the lower stake and back again to the home-stake, he must hit the latter with both of his balls on one or successive strokes to finish the game. If he hits the stake with one ball but not the other, the former is known as a "rover" and can play on any other ball once during each turn of play. All balls must be continued in play until two partner rovers are driven against the home-stake by a single or successive strokes.

Various "out of bounds" rules apply. If a ball is shot over the boundary it must be returned at right angles from the point where it stops. No play is allowed from balls beyond the boundary-line except when a ball is placed in contact with another for the purpose of playing therefrom. If a player hits a ball which is out of bounds by a direct shot his play ceases. A number of fouls can be committed, such as playing out of turn, playing the wrong ball, playing the wrong direction through the wickets, or interfering with opponents' balls. The penalty is generally to cease play. The balls may remain as they are or be returned to original positions at the option of opponent. Fouls are seldom committed intentionally, and in an unofficial game little attention is paid to them.

ROWING.—As everyone knows, rowing is the propelling of a boat by means of oars used as levers. Rowing is as old as history, but its use as a sport is of comparatively recent origin. No doubt there have been boat-races ever since boats were invented, but it is only within the last hundred years that such races have become a regular thing on sporting programs. It is scarcely more than fifty years since special racing "shells" have been used. Previous to that almost any kind of a boat was utilized. In comparison with running, wrestling and jumping, the sport of rowing is in its infancy.

There is considerable difference between the rowing done



PHOTOGRAPH INTERNATIONAL NEWSREEL

PLATE 41. Yale University rowing crew compared with two veteran oarsmen (in inset), one at 85 and the other at 71 years of age.

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in special races and that done merely for amusement, or as a means of travel over water. At present the boat used for races is very light and quite long in comparison to its width. It would never do to attempt to travel in it in rough water. It is less safe than a canoe, being designed for speed and nothing else. The boat is made in various sizes, for two, four and eight rowers. The seats are of the sliding variety and there is a special foot-board. Each rower handles only one oar, but all must work together, each one carefully learning the correct technique. At the beginning of the stroke he must lean forward in a certain manner, keeping the back straight and extending the arms straight forward, but bending the legs and drawing his seat forward. Then the oar must be dipped in the water just far enough and with the blade in the proper position to secure the greatest leverage. The stroke is performed by first straightening the legs and forcing the sliding seat backward, and then bending the arms and leaning backward so as to make the stroke as long as possible. Recovery must be done very quickly but smoothly, and the oar must be "feathered" over the water so as to steady the boat without retarding its progress. The lifting, sinking and feathering of the oar are done mainly by the movement of the wrists. It can thus be seen that athletic rowing is a fairly complicated matter, but this adds to the mental interest. Sculling, in which one man handles two oars, is done in much the same manner, except that the oars are gripped in a little different way. Ordinary rowing, such as is done by amateurs for amusement, is a rather hit-or-miss proposition, though some take sufficient interest to develop a near-racing technique. The important thing for amateurs to remember is to keep the hands opposite each other, and to pull evenly on the oars so as not to be going about in circles. Since all ordinary rowing is done with two oars, the novice will always have the job of watching both at once.

**Technique
in Rowing**

This form of rowing is better for the health than racing. In racing there is always the possibility of overdoing, and one must be in good shape before taking it up. Ordinary rowing can be graduated to suit the individual needs, and as regards the character of the exercise, and the breathing of the air over the water (which is usually cleaner than that over the land),

**Benefits
of Rowing**

Endurance an
Important
Factor

it has much the same advantages as racing. It is excellent for broadening the chest, because it both develops the shoulder muscles and induces deep breathing. In fact, all the muscles of the body are used in rowing, though the legs do not receive as much exercise in ordinary rowing as in racing. The back and abdominal muscles are quite strongly affected, and this makes rowing of exceptional value, for in many sports these muscles are rather neglected.

Amateur rowing will in some respects serve as good preliminary work for racing. It will tend to develop the kind of physique needed. Those who have been to rowing races are always struck with the fact that the rowers are all big men, tall, broad-shouldered and powerfully-muscled. The training for a rowing race is quite rigorous and aims to strengthen and toughen the entire body. This form of competition often calls for the last ounce of strength that is in a man. Strength and endurance are about equally important, but good form ranks equally with them. Amateur rowers who have any intention of taking up racing should be careful of their technique, as bad habits may be acquired that will be difficult to break later.

Running as
Exercise

RUNNING.—Running may be work, a sport, or a form of athletics. If one has to run to catch a train it is work, but if one runs for the joy of running, or runs in playing various tag games or Hare and Hounds, it is sport. It becomes a form of athletics when the mechanics of stride and of arm and body motion are considered, and when special training is employed to fit one for competition in the various established races. These include distances from 50 yards to over 26 miles. The shorter races—50, 100 and 220 yards—are known as the sprints, and since the training required for this form of running is rather different from that for the longer distances, it will be discussed under its own heading, "Sprinting." Running as here considered will include all distances from 440 yards up. The 440 is a sort of combination sprint and running race, on the border-line between sprinting and running; but the longer distances are strictly running, though they may include a sprint finish. The running done by the ordinary person in times of necessity may be either sprinting or running, though usually the former, but the stride used is more

likely to be a running one than the driving action of the true sprint. The ability to sprint properly will come in handy on many occasions, especially when dodging traffic. However, the only persons who do much running nowadays are athletes, so the chief attention in this article will be given to athletic running.

Running has always been a part of athletic training, almost regardless of what particular event one may be training for. Boxers and even wrestlers do their "road work" regularly. Weight-throwers and jumpers find it increases their endurance and leg strength. Only in sports requiring movements similar to running, such as skating and swimming, is this form of exercise neglected. Running races are usually considered the most important events in a track and field meet. Such races have been held since the dawn of history and probably before, and have always been popular; but it is only in comparatively recent years that running has been reduced to a science, the early training for which consists largely of learning how to lift the legs, place the feet, swing the arms and slope the body. Natural ability is still an important factor to consider in the making of champions, but without the proper technique no man will do his best.

Running: Its
Relation to
Other Sports

As far as health effects are concerned, however, technique matters little. The novice will secure as much benefit as the professional, and this benefit will not be small. Running is one of the best of all health-builders; it is the typical constitutional exercise. Its effects are upon the heart, lungs and other vital organs, even more than upon the muscles. Strong, vital organs, which mean stamina and endurance, will carry a runner through, even if he has little more than ordinary muscular strength. Some people have plenty of natural stamina; but many will have to develop it, and in the process of doing this the muscles will also be hardened sufficiently to meet all demands. There will not be a bulky development, because this is of no advantage to the runner, but there will be great firmness and tone to the muscles. Considerable bulk may be developed in the case of a sprinter, as he needs power for short extreme exertions; but the runner needs endurance most of all. In training to be a runner the outdoor exercise, the deep breathing, the benefits of air and sunlight on the

skin, will all improve the functions of the body, and with proper diet and plenty of sleep the health will be greatly benefited. Moreover, these benefits will last for a considerable time after the running is discontinued, and may be made to last indefinitely if one continues to live rightly and do a little running (without racing) several times a week. Easy running, like walking, may be continued to an advanced age. The plan of alternate walking and running has been found excellent in maintaining a generally hardy condition of the entire body.

**Equipment
for Running**

The equipment required for running is not extensive. The shoes are the most important. Whether running for sport or in competition they must be soft and comfortable. Special running shoes are always the best if they can be obtained, and are very necessary if one is competing. Special spiked shoes are employed for the shorter races. When merely out for a pleasure jog, tennis shoes, or any old, well broken-in footgear may be worn. It should not be necessary to caution women against trying to run in shoes with high heels or pointed toes, as it is obvious that they are entirely unsuited for the purpose. Running is just as good for women as for men and they should use this exercise freely when properly shod. The minimum of clothing should be worn so as to avoid overheating or constriction of the muscles or chest, and to allow the air and sunlight to reach the skin. Running trunks and shirt can be worn in quite cold weather, a sweater being added to keep the arms warm if necessary. Women as well as men can wear this costume, since people have at last reached the point where they can contemplate the exposure of feminine limbs without being shocked. If unable to go directly to the dressing quarters at the conclusion of a run in cold weather, it is well to have an extra wrap at hand so as to avoid chilling.

If one wishes to use running merely for health, it is well to simply jog along at a comfortable pace for a sufficient distance to induce moderate fatigue. The jog is generally described as the slowest pace next to walking. Three times a week is generally sufficient for such a run. One must always start with a short distance and increase gradually, and the general training rules outlined at the beginning of this chapter must, of course, be followed. Especially when just beginning it is well to combine walking with running. A brisk

walking pace is assumed until well warmed up, then the jog is used until slightly out of breath, after which the walk is resumed until recovered. This routine is then repeated continuously until there is a feeling of moderate fatigue. Never carry the running to extremes and do not do much fast running. After one becomes accustomed to the jogging it is permissible to speed up the pace occasionally and to finish the run with a little sprint, but this fast running should always be regulated in accordance with one's feelings. If it is thoroughly enjoyed it will be right. At the finish of the run it is well to take a dry rub and cool shower, or, if one has perspired considerably, a warm shower followed by a cool one.

**Where to
Run**

Indoor running on a gymnasium track is never so valuable as outdoor running, but is better than no running at all. If there is any choice pick the best-ventilated gymnasium. Whenever possible, however, go out of doors. This will be easy in the country, as there are always dirt or gravel roads that make a very good running-surface; but even in the cities there will generally be a park where running will be possible. In the larger cities people are so familiar with seeing runners in the parks that they think nothing of it. It is possible to run on city streets, but the surface is so hard that one tires quickly. Schools and colleges are usually equipped with a specially-built track, and if such is available it will make the running easy. However, it is well to take an occasional cross-country jog where one will encounter all kinds of roads and rough ground. This not only makes the run more interesting but also more healthful, for it develops greater strength and endurance.

Running races are usually held under the auspices of a school or college which has a fully equipped athletic field, including a running track. For the shorter races the track is marked off with cord so that each runner must keep to his own lane. There must be a starting and a finish line, and the distance around the track must be marked off. For official contests there must be a starter, timer, judge and various officials. Such meets are held frequently and the interest in them is constantly increasing. These inter-school and inter-sectional meets are usually training grounds for the international Olympic games. Most world's champions are college

**Running
Races**

men. The track events on the Olympic program always receive much attention and publicity, especially the classic Marathon run, and winners prize their laurels highly.

Preparation
for the
Proper
Distance

In training for active competition it is not only necessary to observe all the general training rules already given, but to give attention to special training for improving form and building up endurance and speed. This training varies somewhat for the different races and must always be individualized to a considerable extent. Each man has his own peculiarities which must be taken into account. In fact, when one becomes interested in running, the first thing to determine is the race for which one is best fitted. A man who is naturally speedy but lacks endurance should go in for sprinting, while the man who has plenty of stamina but lacks speed should interest himself in the longer runs. It does not matter so much about the length of one's legs or other anatomical points, though as a general rule the heavily-built man will do better in the sprints and the one of lighter build in the runs. Often a natural sprinter will long to become a Marathon runner, or *vice versa*: but the wise man will stick to the form of running for which he is best fitted, doing just enough of the other kinds to avoid becoming one-sided. The special training points will be considered separately for each race, but no attempt will be made to give full details, as these are best handled by a personal coach who will be in a position to judge the particular runner's needs in accordance with his performance.

The 440-
Yard Run

The 440-yard run.—This race is really an extended sprint, and anyone who desires to specialize in it should give considerable attention to sprinting. Best results are usually obtained by starting the race the same as a sprint and sprinting at the finish, relaxing the speed a little during the middle of the race. The first half of the race should be run faster than the second half, though not so fast that the contestant runs himself out. A good start and a good finish mean a lot. A runner who uses the long stride employed in the half-mile and longer races may win a quarter-mile race if he has unusual strength and stamina and is a good judge of pace, but the man who can produce a fast start and finish has the better chance.

If one has not been doing any running it is well to start training for this race two months in advance of actual com-

petition. This will give one an opportunity to start slowly. The first month is devoted chiefly to jogging and striding exercises, together with whatever calisthenics may be necessary for building up weak muscles. The running never exceeds three-quarters speed. Toward the end of the month a few starts may be tried. The second month's work includes jogging for warming up and tapering off, striding exercises over distances greater than the quarter in order to build stamina, and plenty of starts and short sprints to increase speed. If other runners are available the sprints may be made mildly competitive. Toward the end of the month races of 300 or 350 yards can be taken at full speed. This fast work is taken only three days a week, the remaining days being devoted to jogging and striding, with a few starts. After entering competition the rule of resting two days before every meet should be observed; also there should be the usual rest on Sundays. The amount of training taken between meets will depend on their frequency and the athlete's reactive powers. For one competing every week, one day's training per week may be sufficient, though most runners take two or three and then take a week of complete rest after a hard contest, or when there is a little longer period than usual between contests. Great care is observed during the intervals between contests not to overtrain.

The 880-yard run.—This race is a true run, for one cannot sprint the entire distance or even a large part of it; yet it is well to sprint at the start and finish so that in many respects the 880 is run similarly to the 440. It depends upon the type of runner just what kind of a race should be run, but as a rule it is well to follow the crouching start, with a sprint of 30 to 50 yards, and then drop into a long stride until near the tape, when a change is again made to the sprinting style. These sprints cut down on the time materially without producing more fatigue, for the sprints use the muscles in a manner somewhat different from that of the long running stride. If one finds it difficult to adopt this style of race, one will have to depend on a very strong sustained run at nearly full speed for the first 600 or 700 yards, completing the race at the best possible speed. This requires great stamina. Stamina and a judgment of pace are the main points in the 880-yard

**The 880-
Yard Run**

run, but speed is also highly important. Stamina is required because the pace is very rapid in proportion to the distance. A judgment of pace is necessary, because the first part of the race should be run faster than the second. If the runner is able to judge his own pace and the pace of the leaders, he will be able to do this without running himself out and will have a good chance to come up to the front near the end of the race if he should be behind up to that time. Many times the leader will set such a rapid pace at the start that he fails at the finish. Experienced runners seldom do this, however, for experience is the great teacher of pace. Another important point to remember is to keep the arms and upper-body relaxed as much as possible, except while sprinting. Vigorous pumping movements with the arms are exhausting and do not help the speed much, except when sprinting. The arms should be allowed to hang practically straight, and they and the body should swing easily without tension. As in all running the body should slope forward, but without bending, in order that each step may be a sort of falling forward. The head should be kept in a line with the body.

In training for the 880-yard race, practically the same plan is used as for the 440, except that more jogging and striding are done. The starts and sprinting should not be neglected, however, and it is well when striding, to vary the pace with occasional bursts of speed in order to become accustomed to changing quickly. Sprinting will help to develop stamina as well as striding. The exact schedule will vary with the individual, for the man lacking speed will require more practice in starting and sprinting, while the man having plenty of natural speed but lacking stamina will need more jogging and striding over distances greater than the half-mile. Always warm up before a contest by striding 50 or 100 yards and practicing a few starts.

The mile run.—This is naturally more of a run than the half-mile, and endurance and pace judgment are even more necessary, with sprinting less important. In a run of this length it is important to adapt the style of running to the individual's natural abilities. Every runner will have his own ideas as to the best way to run the race. As a rule, however, it is customary to run the first half rather rapidly, slow down

for the third quarter and part of the last, and then put on a burst of speed for the last 300 yards or so. This final effort may be in the form of fast running or a genuine sprint, depending upon the runner's natural inclinations. The sprint is generally to be recommended, however, because of the change in the way the muscles are used. After more than three-quarters of a mile of powerful striding the legs will be rather tired; but the change to the sprint style will enable the runner to make use of other muscle-fibers and nerve-centers which are not so tired and thereby generate speed that will be surprising. The prearranged plan of running the race may have to be changed on account of weather or track conditions or unexpected circumstances coming up during the race; but as a rule it is well not to make any changes. The plan of running for which one has trained will generally be the most effective.

Sprinting

In training it is customary to make the preliminary work much like that for the 440 and 880, except that longer distances are covered in the jogging and striding. Special attention is given to keeping the upper-body relaxed. Proper form is always important even in the longest races. When ready for real work, three days a week are devoted, in order to build endurance, to jogging and striding distances greater than the mile. Two days a week may be devoted to speed work, consisting of some starts and sprints with fast 440's and 880's run on alternate days. These should be timed so that one may develop the ability to judge one's pace. On the sixth day a long walk is taken, unless conditions seem to indicate that it would be better to give the time to correcting special weaknesses. All general rules of training are carefully observed, for in a mile race endurance is a prime factor and this depends as much on the general habits of living as on training in running.

Training for
the Mile Run

The two, five, and ten-mile runs.—These runs are not used very much except in Olympic competition. Runs longer than a mile, and especially the two-mile are rarely found on the program of intercollegiate meets. They demand endurance primarily, and if carefully trained for are great health-builders; but few people are in a position to put in the necessary time. The two-mile race is run and is trained for in much the same way as the one-mile. The five, and ten-mile runs

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require training similar to that for cross-country running, except that all practice runs are done on the track. More attention is given to speed when training for the five than for the ten-mile run. Running form for these races is much the same as for the mile; but each one should use the particular variation of the standard style which best suits his needs, as it is very important that the stride be easy, free and relaxed.

The Marathon.—This famous run always arouses great public interest, but not so much among athletes. It is too much like work. There are few runners who have the stamina to keep going for 26 miles, 385 yards. From the standpoint of health it has no advantages, as training for shorter races will give one strength and endurance without the possibility of losing much of it in the final competition. The Marathon is certainly a test of any man's endurance and grit, and one will have little company in training for it. Apart from the race at the Olympic games, which take place every four years, about the only Marathon races run are a few special ones held as trials for the greater event. Many of these races, too, are only modified Marathons, sometimes being no more than 10 miles.

The training is mostly jogging and walking, three days a week for the former and two for the latter, with two days' rest. The full distance is rarely run in training, the jogs being limited to ten or fifteen miles and often being cut to five. One must be guided by one's reactive powers. As always, it is important to avoid doing too much. Alternate walking and running may be used occasionally. Special attention is given to every phase of right living. The vegetarian diet is especially recommended, as it is more conducive to endurance, and over-eating must be carefully avoided.

Cross-country running.—This is a very interesting and healthful form of running, especially when competition is omitted. A cross-country jog that is well within one's powers will be greatly enjoyed and will produce a feeling of exhilaration, especially in the spring and fall, or on mild winter days. A certain amount of crispness in the air gives one more "pep" and adds to the benefits received. When thus running for pleasure the pace is not varied much, a steady jog being proper. In competition the pace will be varied according to

the character of the country over which one is running and in accordance with the individual preferences. The sprint finish is not important but may come in handy, so that a little sprinting should be done in training. This will also help to increase the general speed.

The distance of a cross-country run may be anywhere from three to seven miles, as determined by the committee in charge of the competition. Teams are entered instead of individuals, but each man runs for himself to a large extent, because points are scored by the first three to five members of a team to finish. The form of training will vary with the distance, and the suggestions already given may be applied. However, three times per week is generally the maximum for the actual cross-country work. Any track work which is done will be largely short sprints and practice in perfecting one's stride. A smooth, easy gait with the body well relaxed is very important. Flat-footed running may be adopted if one finds it easiest. It is especially important in cross-country work to start with a distance that can be traversed with but moderate exertion and to increase gradually as the endurance is built up. Forcing oneself will only hinder progress and will, of course, nullify the health benefits.

Relay-racing.—This is team-racing; that is, from two to eight men run in succession to cover a certain distance. The usual number is four. The team covering the distance in the shortest time wins. While winning a relay race does depend to some extent on team work and a proper placing of the men, yet each man runs his own race and has just as much responsibility as the others. A relay-race may therefore be considered a succession of races, each run according to the suggestions already given for the prescribed distance. The most popular relay is the mile, wherein each man runs 440 yards. However, the separate runs may vary from 100 yards up to a mile. Distances greater than a mile for each man are seldom used, because it would make the race too long. As the methods of running these different distances and the training for the same have already been covered, the important points to consider here will be the placing of the men and the passing of the baton. The latter is very important.

Relay Racing

In placing the men it is customary to put the slowest first

and the fastest last; but if the abilities of the competitors are fairly well known, it may be advisable to change this order for the purpose of gaining a big lead, or to put the fastest man against the fastest, or for other reasons which may come up. In judging the men, their condition at the time of the race should be the deciding factor rather than their past performances. A runner who has been in one or more races will naturally be somewhat tired and cannot be expected to run as well as usual. Unfortunately, few men train especially for the relays, so that it is practically always necessary to use some who have run before. All the men used should have had training in passing the baton, as weakness or failure here may turn victory into defeat.

The baton is a short stick of light wood which must be carried by each man and passed to the next man running on his team. A space ten yards long is marked out on each side of the starting-line and the baton must be passed within these twenty yards. There are various methods of passing the baton, but it has been found most satisfactory to have the first man start with the baton in his left hand and pass it to the right hand of the next runner. The latter transfers it to his left hand any time that he desires while running, so as to be ready to pass it to the next man. The last man lets it stay in the right hand to the conclusion of the race. When the crouch start is used the baton may be grasped between the thumb and first finger, the other three fingers being on the ground. Only the first runner will use this start. The baton may be passed while both runners are in motion or while the new man is standing still, the former method being used for short races and the latter for long ones. The prime necessity in all cases is safety, as more time will be lost by dropping the baton than the extra second or two consumed in making a good pass. A firm grip should be kept on the stick at all times until the next man has it. All who intend taking part in relays should devote considerable practice to passing the baton, as this is the distinguishing feature of these races.

Passing the
Baton

SHINNY.—See *Hockey, Field*.

SHOT-PUT.—See *Weight-Throwing*.

SKATING ON ICE.—It would be difficult to find a better constitutional exercise than skating. It compares favorably

even with walking, since it is more interesting and requires more exertion; but of course its use cannot be as general as walking. Ice satisfactory for skating requires a particular kind of cold weather, and this can be obtained only in certain sections and at certain times of the year. Artificial ice is very satisfactory for skating but unfortunately such "rinks" are located indoors and this eliminates one of the chief advantages of ice-skating—the cold, bracing fresh air. A compromise, which will make skating available in any community where the weather is cold enough to freeze water, is the flooding of some level piece of ground having a concrete or wooden rim around it to hold the water in. Skating on such ground is not as interesting as skating on a larger body of water, or on a winding stream but it gives all the health advantages of this fine sport. Skating for amusement has given rise to great interest in skating races and in fancy skating, and these are quite a feature at winter resorts and in large cities where indoor rinks are maintained.

Ice-skating
and the
Outdoors

The peculiar advantage of the exercise obtained from ice-skating is that it is not merely muscular movement, but



PHOTOGRAPH UNDERWOOD & UNDERWOOD

Skating strengthens many muscles and is a superb exercise for the heart and lungs. It is an exercise that appeals to both sexes and to all ages.

rhythmic, balanced movement. Thus, in addition to general vital vigor, muscular control, coordination and a sense of harmony are developed. Ice skating, like dancing, makes one graceful, and grace means controlled strength. The amount of exercise obtained from skating may be graduated according to the needs and desires. Racing and fancy skating will naturally require greater exertion than ordinary skating. Once one has learned to keep balance, one can swing along at a good speed for hours without becoming tired. This is partly because of the stimulation of the deep breathing of cold air, which speeds up all the functions of the body, especially circulation and elimination. There is nothing like ice-skating to bring color to the cheeks and create a genuine appetite. The harmonious motion is soothing and cheering, and makes one more joyful; griefs and cares are forgotten, and new strength and courage are generated to meet the trials of life. Such a mental effect is invaluable from the health standpoint. One need not be an expert to obtain these benefits, and regular skating alone would be sufficient for health purposes in winter. Since variety is the spice of life, however, it is well to include some games, and if necessary some developmental exercises. Let skating be a partial substitute for walking.

Equipment
for Ice-
skating

To obtain the greatest benefit and enjoyment from skating, one's equipment should be as good as possible. For racing and fancy skating equipment is vital, as any failure may give rise to painful injury or even death. It is always best to wear special shoes which have the skates riveted to them, as there is less chance of their coming off. The particular style of skate used will depend on the individual preference and the kind of skating to be done. Special skates are made for racing, skating games and fancy work. At all times the skates should be kept sharp and free from rust. Aside from skates and shoes no special equipment is required, but the clothing worn should always be as light and pliable as is consistent with warmth. Woolen stockings, knickers, sweater, muffler, woolen cap and gloves are the usual costume. These garments are all very flexible, yet they are warm and protect the important points, the ears, back of neck and wrists.

The technique of ordinary skating is simple. The first

thing to learn is to keep the balance on the thin steel blades. This is a matter of practice and strength of the ankles. If the ankles are weak, it is well to take special exercises to strengthen them before taking up skating. A high shoe to support the ankle cannot take the place of strong muscles and ligaments. Once one can keep the balance skating is easy. Then attention should be directed toward securing relaxation. The stride should be free and long, relaxing the leg not in use at the moment. The upper-body should also be kept relaxed, with arms swinging free as in distance running, unless great speed is desired, when the arms can be used more. Relaxation and rhythm make the good skater.

In training for races one will have to practice starts and special speed strokes, though one should always use the stroke that comes most natural, if it is anywhere near right. Most speed racers have their own particular style. One should be careful to toe straight forward and not to become too tense. Special attention must be given to the practice of rounding a curve at high speed. This is generally done by crossing the legs. General bodily strength and agility are very helpful, especially in emergencies. A slight irregularity in the ice when traveling at high speed may be enough to produce a spill, but quick and effective action will prevent injury and may permit one to continue in the race. All general rules of training apply and also much of what has been said under "*Running*," as races are of various lengths and are skated along the same general plan as they are run.

Technique in
Ice-skating

Fancy or figure skating is a highly interesting sport, but it requires long and faithful practice. Form is the important factor and, as always, this will have to be developed gradually. Figures should be skated slowly at first and in large sizes, giving particular attention to the carriage of the head and body and the handling of the free leg. These count much in producing a graceful appearance. In order that the head may be kept up, avoid looking at the ice any more than is absolutely necessary. Simple figures should be practiced first until one is thoroughly at home on the skates in all positions, going forward, backward, in circles, etc. There are many standard figures used, but as these are best learned from personal instruction they will not be considered here. Fancy skating in

pairs and dancing on skates are further possibilities for the skating enthusiast.

SKIING.—Skiing includes walking, coasting and jumping on skis. The ski is a long flat piece of wood which is attached to the foot, and by distributing the weight over a larger surface enables one to walk over deep snow without sinking in. The use of the ski is mostly limited to those sections where there is much snow and a long winter, though lately skis for children have become quite popular and are used for amusement if there is no more than enough snow to cover the ground.

The ski was originally a necessity in getting about in cold countries, but is now used chiefly for sport. Ski-jumping has become so popular that national associations have been formed and annual tournaments are held. Because these are so spectacular, they are usually filmed for the moving-picture news reels, and have thus become widely known. If it should happen that there is not enough snow on the ground at the time for a tournament, it is often brought great distances in freight-cars so that the contests can be carried through on schedule. This

indicates the popular interest, even though comparatively few people actually use skis themselves.

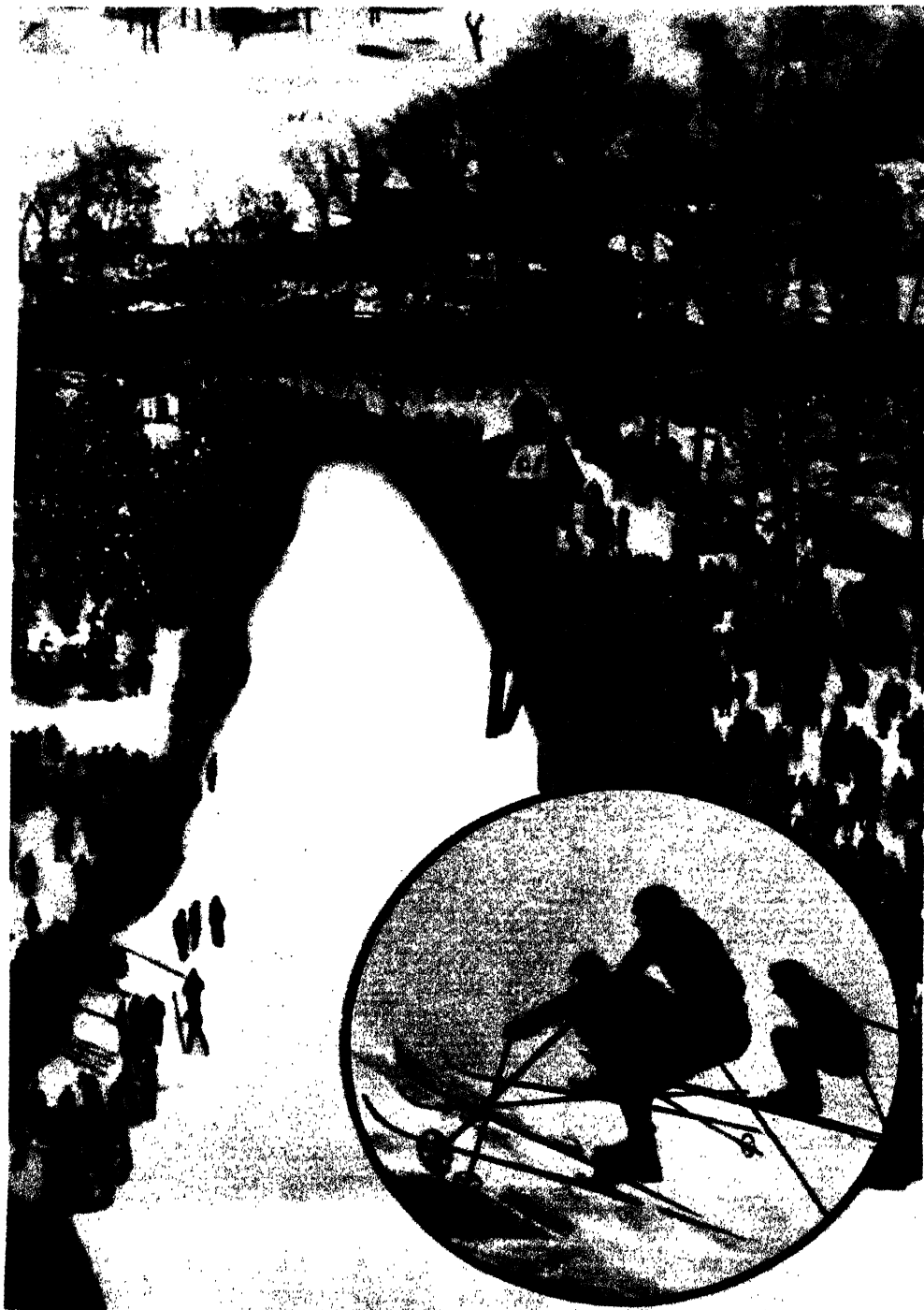
The health advantages of skiing are practically the same as those of ice-skating and coasting. In fact, it is a mixture of the two. Going up-hill it is much like skating in zig-zags. The skis are slid along over the snow much as the skate is over the ice. Surprising speed can be maintained, eight or nine miles an

**Training
Skill: The
Important
Factor in
Skiing**



PHOTOGRAPH EWING GALLOWAY

A ski-jumper beginning a long jump.



PHOTOGRAPH WIDE WORLD—KEYSTONE VIEW

PLATE 42. A long jump in a ski-tournament in middle Western America, with thousands of spectators gathered.

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hour being not unusual. It takes some time, however, to learn to use the skis to the best advantage. One must first learn to balance, and for this a balancing stick and sometimes two may be required. Even an experienced person usually carries one stick, as it will prevent many spills. After learning to balance, one must learn to steer and to keep the skis from getting mixed up with each other and tripping the wearer. One look at a pair of skis will indicate why it takes skill to handle them.

The ski is a flat board from 5 to 10 feet long and only about 5 inches wide. It is an inch thick in the middle, but is thinner toward the ends and is turned up in front. The board is varnished and polished and often decorated, and there is a ridge or groove lengthwise of the bottom in order to prevent side-slips. The ski is attached to the foot by only a single strap which passes over the toes, but another strap passes from this one around the heel of the foot so that the connection is made more secure without interfering with the lift of the heel. Even so the attachment is very flexible, and this is one reason for the difficulty of handling skis.

Having learned to handle the skis in cross-country travel, the greatest thrill of all is in store. This is ski-jumping. A long hill is selected, down which one can coast and gain great momentum; then near the bottom there is a slight rise for a take-off and the jumper adds to his leap by crouching slightly and taking off as for a broad jump. Naturally one fairly flies through the air, and jumps of as much as 150 feet have been recorded. Spills are the order rather than the exception at first but as there is plenty of soft snow in which to land accidents seldom happen. In time, the ability to maintain one's balance at the end of the leap is attained. One is then ready to enter competition if desirous of doing so. It takes considerable hardihood and daring to be a successful ski-jumper, but few of them do any regular training. Their training consists of the habitual use of the skis, traveling miles every day in the cold air, which naturally has a marked effect in increasing the vitality and endurance. Most of them have outdoor occupations and indulge in other winter sports. They are thus well prepared, and with a little practice to get accustomed to the breath-taking speed and to keeping the balance, they are ready

Ski-jumping

for a contest. Ski-jumping and other such hardy winter sports are just what is needed in these days of a softening civilization.

SNOWSHOEING.—Snowshoeing is in many respects similar to skiing. Both serve the same useful purpose of enabling people to get about over deep snow, and have the same health advantages, but not the same sporting possibilities, for one cannot coast or jump on snowshoes. They are strictly for walking, and hence are not used so much for sport as for business. In cold countries they are of considerable value, for often there is no way to get about except by walking, and walking over the deep snow is not possible without snowshoes or skis. Even when it is not necessary to walk anywhere, the daily “constitutional” may be taken on snowshoes when it would otherwise be impossible. The popularity of winter resorts is constantly increasing, and this has lent interest to the subject of snowshoeing.

The snowshoe consists of an elliptical wooden frame, rounded in front and drawn out to a point behind. The frame is filled with a network of hide or sinew, and there is a wooden brace across the center to which is attached the strap for fastening the shoe to the foot. The shoe is a little more closely woven in this section, except for an opening just in front of the foot attachment which gives room for the motion of the toes when the heel is lifted. The one strap passing across the toes is the only fastening of the shoe. There are many types of shoes, each being designed for a particular purpose. The frame may be fairly long and narrow, or so short and wide as to be practically round—the bear-paw type. The latter is used for mountainous country. The type of the hide network is also governed by the character of the country in which the shoe is to be used. In very cold countries, where the snow is likely to be loose and flaky, a quite closely woven shoe is required, in order to give more supporting surface. In a warmer climate, where the dampness causes the snow to pack and crust over, a smaller shoe may be used, but it should have a heavier filling. If the snow is not crusted over, the heavy filling should be quite closely woven, for a loose weave permits clumps of snow to adhere to the shoes and makes them very heavy and tiresome to handle.

Learning to use snowshoes takes practice, just as skiing

Snowshoeing:
A
Constitutional
Exercise

Snowshoeing
Equipment

does. It may look simple enough, but one has only to try it to be disillusioned. A novice should never attempt a long trip, where his safety depends upon the shoes. The action is quite different from that of ordinary walking. In the first place the shoes are not entirely lifted from the ground, only the front section being raised; but if one attempts to slide them completely there will be a spill. A certain amount of sliding motion is necessary in order to hold the shoe on the foot with the single strap, but the front must be lifted so that it will not dig in. This is done by raising the knee and requires a comparatively high-stepping action.

The step must be not only high but wide. Snowshoes are from a foot to a foot and a half wide, and the legs must be kept spread if the shoes are not to foul each other. A sort of rolling motion is used, shifting from one foot to the other, keeping them well spread but toeing straight forward. At the conclusion of a step the heel rises and the toe bends over the toe-hole in the shoe, allowing it to swing as on a swivel. Care must be taken not to allow the foot to extend too far over the toe-hole, or one may stumble. When going up or down hill the action must be accommodated to the partial degree of incline.

Technique in
Snowshoeing

Once one has learned to use the shoes effectively, it is surprising what speed can be made. In snowshoe races records of most astounding speed have been made. This is very nearly as good as the records made by champion sprinters and runners. Of course the usual rate of speed is less than this, and as there is not much racing on snowshoes, speed is not a primary factor in their use. The main thing is safety, which depends not only upon the skill of the user but on the strength of the shoes. They should be strongly made of the best materials, so that they will not fail just when they are most needed. On a long hunting trip a broken shoe may spell disaster.

SOCCKER (Association Football).—This is genuine "foot" ball, for it is played largely by kicking. It is quite a popular game in the United States and in all parts of the British Empire, but is also played in other countries. Interest in the game is increasing in the United States, which is well, for it has much to recommend it. It is not so violent as ordinary

Soccer and
Football

football, yet calls for plenty of action and requires ample strength and endurance. It is played chiefly by students at colleges, preparatory schools and high schools.

Technique of
Soccer

Soccer has all the health advantages of any active outdoor game, such as fresh air, sunlight, exercise and deep breathing. The exercise is perhaps not so well balanced as it might be, since the arms are used but little, but the other parts of the body get plenty of activity. The three important movements in soccer are kicking, running, and pushing or "charging." Considerable body-bending is also required. These movements demand and build endurance. The soccer-player must be strong, agile, fast on his feet and able to keep going. The game is a strenuous form of constitutional exercise, as the great amount of running develops the heart and lungs. One must be in reasonably normal condition to start with, however, as the game is so exacting that weak persons might be injured. There is not the same danger of injury as in ordinary football, but hard knocks are by no means infrequent. Preliminary training in the form of graduated running and general exercise is of value.

Anyone who wishes to excel at soccer must be willing to follow strict training rules. Speed and endurance are at a premium and they can only be obtained by giving careful attention to every phase of right living. Overeating, and the use of refined, denatured and other unnatural foods must be strictly avoided; also tobacco. Plenty of sleep is important. Practice in handling the ball with the feet is very necessary. The ball should always be kicked with the instep, or either side of the foot, and not with the toe.

Soccer.—Equipment.

The Field: A level piece of ground, 110 by 65 yards. The goal-posts are placed 8 yards apart with a cross-piece 8 feet above the ground, the whole being backed by netting, as in field hockey.

The Ball: Leather-covered, rubber bladder, air-inflated, 27 to 28 inches circumference and 13 to 15 ounces in weight.

Uniforms: Special shoes with cleats on the bottom are advisable; the rest of the uniform is optional. Shin-guards, however, will be appreciated by most players.

The Players (Eleven to a team).—Five *Forwards*; three *Half-backs*, two *Full-backs* and a *Goal-keeper*. The *Forwards* are known individually as *outside* and *inside right, center, and inside* and *outside left*. The *Half-backs* are classed as *right, center* and *left* and the *Full-backs* as *right* and *left*. The *outside Forwards* are sometimes called *Wings*. The *Forwards* are lined up on the half-way line; behind them are the *Half-backs*, then the *Full-backs*, while the *Goal-keeper* stands immediately in front of the goal.

The Game.—The object of the game of soccer is, of course, to kick the ball down the field and between the goal-posts, thereby scoring a point. The team making the most points wins. The game is limited by time, being played in four parts or quarters of 22 minutes each, with a pause of one minute after the first quarter, five minutes after the second and one minute again after the third.

The game is started with the kick-off. Each team lines up as above described facing their opponents' goal. The forwards of the defending side, however, must not approach within ten feet of the ball, which is placed in the center of the circle. The center of the attacking side, which has the kick-off, then kicks the ball as far as he thinks advisable, but at least a distance equal to the circumference of the ball. The ball is then "in play," and the attacking side makes every effort, through its forwards, who kick and pass the ball (by kick) from one to another to advance it down the field until near enough to the goal to be kicked through. In the meantime the defending side is making every effort to gain possession of the ball on its own account and advance it toward the goal of the attacking side. The work of attack is done chiefly by the forwards and that of defense by the backs and the goal-keeper. The latter has quite a job on his hands and is allowed special privileges, such as the use of his hands in stopping and picking up the ball; but he may not carry it more than two steps. All other players are prohibited from using their hands to advance the ball or interfere with an opponent; everything must be done with the feet, except that one may bunt the ball with the head, or "charge" an opponent to prevent him from kicking the ball. Charging consists in throwing one's weight against an opponent, using any part of the body from shoulder

Rules in
Soccer

to hip. It will thus be seen that soccer is a real kicking game and requires educated feet.

Players must remain on-side, or discontinue playing while off-side. Any player on the same side as the one playing the ball who is nearer his opponents' goal-line than the ball is off-side, unless at least two of his opponents are nearer their own goal-line. Anyone who plays the ball while off-side commits a foul. Various other fouls may be committed, such as using the hands, rough play, illegal charging or improper "throw-in." The penalty is a free-kick. If the ball goes out of bounds a player of the side opposite to that which played it out must throw it in from the point on the touch-line where it left the field. If the ball goes out of bounds over the goal-line it is returned by a kick instead of a throw-in. Ends are changed at the conclusion of each playing period.

Fouls
in Soccer

For an ordinary game it is not necessary to know or to utilize the fine points in the rules. Just as much health value is obtained from kicking the ball up and down the field, every man for himself, without regard to rules other than those of fair play.

SPRINTING.—Sprinting is the term applied to extremely rapid running over short distances. The special term is used because a special stride is employed. Running naturally makes one think of a long-stretch stride, but sprinting uses a short driving action. It is essentially a form of athletics, as running for health is done mostly at a jog, and emergency running, while likely to be in the nature of a sprint, is seldom done with any attention to the stride. The sprints are the most popular races among college men and members of athletic clubs, because they do not require so much endurance as longer runs, and there is more chance of coming somewhere near the record. Moreover, most people are better adapted to sprinting than to the longer running races.

Sprinting and
Running

As in the case of jumping, the health benefits obtained from indulgence in sprinting races comes largely from the training. The actual sprint demonstrates the health and strength that has been gained, but only slightly increases it, and if one forces oneself to a state of exhaustion in competition the health will be injured instead of benefited. Proper training, however, will do much to produce a symmetrical

development and general health. It will be observed that all champion sprinters are well-muscled. The training is developmental as well as constitutional in character. The whole body is used, and if any parts are weak special exercises should be taken to strengthen them. The calves, the extensor muscles of the thighs and the buttocks need to be especially strong, but the arms and body must not be neglected. Proper arm action always adds speed to a sprint. These strength-building exercises, together with the necessary jogging for building endurance, not only give all-round exercise, but build up the vital organs as well. A champion sprinter, especially if he specializes in the longer sprints, must be a strong man through and through.

Training for
Sprinting

The most popular sprints are the 100 and the 220 yards. Meets for school children and women usually include the 50 and 75 yards. Whenever possible these are run on a straight-away and in lanes marked out with cord, so that there may be no interference between runners. Spiked shoes are almost a necessity, for the slightest slip means a loss of ground, especially at the start.

A sprint race, even the 220, is essentially a matter of hard continuous effort. One is going at top speed practically all the time. Hence there is little need for strategy or judgment of pace. The main thing is to get away fast and keep going fast right to the tape. The running in lanes further simplifies the race. All the attention can therefore be concentrated on the start and the running form. The start is of supreme importance, for a little distance gained here counts all through the race. This is particularly true of the 100 yards and shorter races. A strong sprinter may come up from behind in the 220, or even in the hundred, but between men fairly evenly matched the start will determine the result. The value of the start has given rise to a tendency on the part of some runners to "jump the pistol"; that is, start before it is legal to do so, but this is poor sportsmanship and must be strongly condemned. If one is caught doing it, it means a penalty or disqualification.

The *crouch start* is used for all sprint races. It gives a much quicker get-away than the standing start, for the reason that the power is applied behind the weight of the body instead of underneath. Two holes are made in which to place the

**The Start
in Sprinting**

feet, the front one being about 5 inches behind the starting-line and the back one at whatever distance is individually desired, depending upon the length of the runner and whether he prefers the long-stretch or close-coupled crouch. In most

**THE START IN SPRINTING**

On Your Mark: This illustration shows the correct position of the body when resting "on the mark." The weight is about evenly distributed between the left foot, right knee and the hands. Relaxation is important at this stage.



Get Set: Second position of the start. The right knee is lifted and the body is shifted well forward so that the weight rests chiefly on the hands and the left foot. The sprinter is now ready to start with a leap when the command, "Go!" is given by the starter.

cases it is placed at such a distance that the right knee will be opposite the left ankle, the left foot being the front foot in practically all cases. The holes should be just deep enough to give a good grip. The first position assumed is with the left foot in the front hole, the right foot in the back hole and the hands, or rather the fingers, on

the starting-line. The fingers are spread stiffly so as to give firm support to the body. The hands should be far enough apart to give good balance. The knee of the right leg may rest on the ground. This position is "on

your mark." An important point to remember here is that the body should be completely relaxed, except for those muscles actually needed to support it. Any unnecessary tension will not only waste nerve-energy but will slow up the start. The mind as well as the body should be calm and relaxed, for any mental anxiety or tension will be more or less reflected in the muscles.

"On Your
Mark!"

At the command "get set," the body is slightly lifted, so that the right knee is free of the ground, and is moved forward so that practically all the weight rests on the hands and the head is well in advance of the starting-line. The back should not be bowed, nor the head raised high to look down the track. The hips should be a little lower than the shoulders. While the arms and neck will be quite tense in this position, the legs should still be kept relaxed as much as possible, especially the rear leg, from which the first stride is made. The left leg, which gives the push and supports some of the weight of the body, will have to be tensed to some extent. The mind should be concentrated on being ready to go at the pistol shot.

At the sound of the pistol the support of the arms is suddenly removed and the body falls forward, the left leg at the same time pushing it forward, and the momentum preventing a complete fall. The left arm, with bent elbow, is swung upward and the right arm backward. The right knee is jerked upward so as to be ready for the first stride. The foreleg is not extended, but comes down on an angle. In the succeeding strides the foreleg is gradually extended, and the body gradually rises until the regular sprinting position is reached. Usually this is accomplished by the fourth stride. Coming erect too soon will slow down the start. Special attention is given to maintaining a good forward body-lean.

The regular *sprinting* action consists of three essentials: the knee-lift, the body-lean and the arm action. It is also important to keep well up on the toes. The knee-lift is necessary in order to get the required driving motion. The knee should be brought well up with a snap and the foreleg is then driven downward with an equal snap. The forward body-lean will make this downward motion partly backward. There will be a little extension of the foreleg, but no conscious attention is given to it. The body should be kept well forward so

that it is in advance of the point where the forward foot touches the ground. The back should not be bowed, however, nor should the head be allowed to go back. The rear leg, body, and head should present a straight line. When the right leg is snapped upward the left arm should come up vigorously, with a motion similar to an upper-cut. The elbow should be kept bent so that as the arm goes backward the hand will not be much below the hip. A straight forward and backward motion should be cultivated, as any tendency to cross the arms in front of the body will interfere with speed. The arms are of great assistance if used correctly, and attention to their action should not be neglected.

Technique in
Sprinting

While the above is the proper technique for the crouch start and the sprint action, each runner should modify the action to suit his own peculiarities, so long as he does nothing awkward. For instance, a small man will probably prefer a close-coupled start, and a tall man may want to get a little more stretch into his stride. Some may want to keep the arms bent more than others. A little practice and timing will soon indicate whether any variations from the standard form will be advantageous. Stiffness should always be avoided. At the close of a race when fatigue supervenes, there will be a strong tendency to let the body become erect and the head go back. This must be avoided by persistent practice, because the form should be better, if anything, at the end than at the beginning, in order that the most may be made of the final sprint. A runner who is a little behind, even though he may feel that he has been going at top speed for the entire race, will find—if he has any stamina left—that he can put on a trifle more speed if he can improve his form. This is especially true in the 220-yards race when a slight let-up in speed is permitted after the first 100 yards.

Training for the sprints is largely a matter of perfecting the start and the stride by practicing coming out of the marks and taking short speedy runs. There should be sufficient jogging and part-speed running, however, to build endurance. The following general plan of training is usually recommended: For the first two weeks it is well to limber up and build some endurance by jogging and moderate running over distances greater than 200 yards, even as much as a mile.

After this a regular program may be adopted for each day of the week. Monday six or eight starts may be taken, each followed by sprinting for 25 yards. One should always slow down gradually from such a sprint, so as to avoid strain. After these starts a sixty-yard run may be taken at top speed. Finally, jog for a quarter-mile. For Tuesday, three or four starts, with the twenty-five-yard sprint, may be followed by 150 yards at practically top speed. Again the work-out is concluded by a little jogging. Wednesday six or eight starts, with sprints up to 40 yards, may be tried. Then a run of 300 yards is taken at three-quarter speed. Thursday is the same as Monday. On Friday, six or eight starts are practiced as usual, and then a trial of the 100 yards may be made at top speed. On alternate weeks this may be extended to 220 yards. Saturday's training will be the same as Wednesday's, but may be omitted if there seems to be any tendency toward staleness. This may not seem like a lot of work, but because of the high nervous tension required for the quick starts and the sprints, it will be found quite sufficient. There is always a considerable tendency to overtrain when practicing for the sprints, and an occasional day's rest is advisable. Of course, the usual rest period before a race is always observed and attention must be given to general training rules.

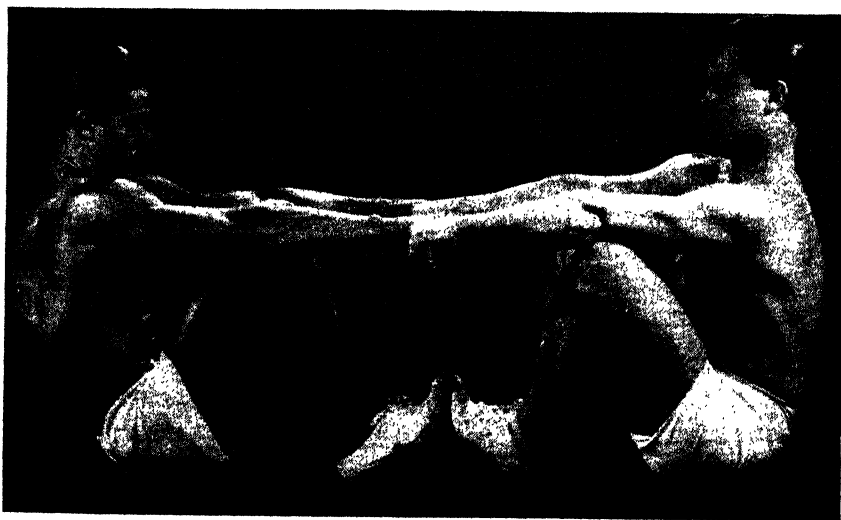
In the sprints there is more of a tendency than in longer runs to the development of stiffness, soreness, strains, pulled tendons and the like, so that a few words on this subject may well find place here. The first thing to remember is always to warm up by jogging or jumping up and down on the toes. Never make such sudden powerful exertions as are required for starting and sprinting without this preliminary speeding up of the circulation and loosening up of the muscles. At the start of the season it may be well to precede this warming up by a massage of the muscles and a few stretching calisthenics. By starting training very gradually as here advised—and this includes the preliminary two weeks of jogging—stiffness and soreness may be avoided. If one overdoes at first and such soreness does result, it is better to lay off for a day than to try to "work it out." Work is what put it in and rest is what takes it out. Whenever possible it is well to follow each training period by a massage and shower. These help to work

**Body Treat-
ment in
Sprinting**

the fatigue poisons out of the muscles into the blood-stream whence they can be more quickly eliminated. The bath also cleanses the skin of perspiration and increases its activity. The bath should be short, however, as staying under either the hot or cold water for an extended time will waste energy. One minute is sufficient for the cold. Extremes of temperature are best avoided in most cases. A real massage, and not just a "rub," should be obtained if possible. If necessary one can massage one's own leg, arm and abdominal muscles. Rubbing is merely friction of the skin, while massage is kneading of the muscles. If competing in more than one race, it is well to don a sweater or other wrap between contests in order to avoid chilling of the surface of the body. This is advisable even though one does not feel cold. Of course, in very hot weather it may not be necessary. At the conclusion of the last race one should go immediately to the dressing quarters.

Variations in
Sprinting

STRENGTH TESTS.—All men and boys are interested in strength tests as sport. They like to try out their powers on one another. The spirit of competition seems to endure throughout life. One of the first strength tests tried is "chinning the bar," or seeing how many times one can draw the chin up to a bar from full-length hanging position. This is as



Pull-Stick is another test of strength. The contenders sit upon the floor with toes braced against each other's, knees flexed, and stick grasped firmly midway between the two. The object is to try to pull one's opponent off the floor. The contestants should be fairly evenly matched as to weight.

popular with the men as with small boys. It develops the biceps, and all males seem to like to "show their muscle" by exhibiting the biceps in a tensed condition. However, it is seldom that any special training is employed to prepare for these tests, and consequently strain is more likely to result than benefit.

Special machines are made which will measure in pounds pressure the strength of any muscle, but there is little interest in these, and there are some men who cannot be persuaded to do a little training unless its object is made interesting. There are a number of strength tests employing the element of competition that will be found attractive. Hand wrestling (*See page 1298.*) is one of these.

I n d i a n Wrestling.—

The wrestlers lie upon their backs, side by side, with arms locked and legs extended in opposite directions. The right sides should be next to each other and the bodies should lie even. The right legs are then raised and lowered twice. At the third raising the legs are locked to-



Indian
Wrestling

The game of Twist-Stick is a test of strength. The contenders stand as illustrated, with legs well braced and hands firmly gripped on the stick. The latter should be held at a point midway between the two men. At a given signal, each bears down on the stick, attempting to twist it in the other's grasp.

gether and each endeavors to bring his opponent's leg down to the ground, thereby turning him over upon his face. Plenty of strength will be needed here.

Pull-Stick

Pull-Stick.—Two sit upon the floor, toes against toes. They grasp a broom-handle between them and at the signal each tries to pull the other up off the floor. As weight counts here as well as strength, opponents should be evenly matched in this respect. This same test can be used without the stick by opponents grasping hands, using the hook-grip.

Toe Wrestling.—The wrestlers are seated on the ground facing each other, and each one places a stick beneath his flexed knees. The arms are passed under the stick and the hands clasped in front of the knees. This doubles the body almost into a ball. The object is to get the toes under those of one's opponent and roll him over backwards. If either wrestler breaks his hand-clasp about the knees, it constitutes a victory for his opponent. While skill and dexterity count considerably here, strength will also be found to be a factor.

Twist-Stick

Twist-Stick.—Two grasp a broom-handle high above their heads as they stand facing each other with legs spread and well braced. Contestants should be evenly matched as to height, and the stick should be exactly in the middle between them. At the word "Go!" the stick must be brought down between them, which causes it to twist within the hands of one or the other. The one who maintains his grip firmly wins. This is primarily a test of the strength of the grip, but the chest, under-arm, back and abdominal muscles are also employed to a considerable extent.

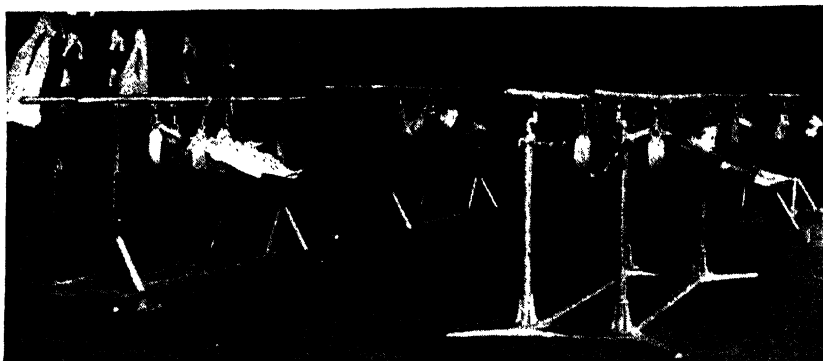
If one is indulging in other forms of athletics, so that plenty of exercise is secured and the muscles are well hardened, it is not necessary to train for these events and they can be used merely as sporting tests. If one desires to excel at any particular test, however, one would do well to take developmental exercise for the muscles chiefly concerned, to observe general training rules if not already doing so, and to practice the test once or twice a week.

SWIMMING.—There have always been some men who could get about in the water by swimming, and at present athletes who have trained for it can swim for a day or more and cover many miles. A long-standing endurance record in a pool is 72

hours, and swimming the English Channel, which was thought to be a marvelous feat not so many years ago, is simply a fine swimming achievement. Opportunities for swimming are now much greater than they formerly were, and there is little excuse for not learning to swim. Even cripples can learn, and fat people, who suffer when they have to take other kinds of exercise, can do a little swimming with actual pleasure. In spite of the constantly widening interest in the sport, however, there are still many who have never learned it, which is greatly to be regretted.

Swimming is first of all very valuable for the health. It combines the advantages of exercise, deep breathing, cold bathing, fresh air and sunlight. The latter two may be lacking when swimming in an indoor pool, but most swimmers seek out-of-door immersion at least part of the year. The exercise obtained from swimming involves all the muscles of the body and therefore produces a symmetrical development. Some strokes use the arms most, others call for considerable work on the part of the legs; but all use all parts to some extent. The peculiar advantage of this form of exercise is that it produces development even though the general effects are constitutional in character. The horizontal position and the support of the water enable one to take a lot of exercise without much fatigue, for the heart does not have to work so hard. The regular, rhythmic breathing also postpones fatigue, even while it develops the lungs. Swimming should not be hard work. Once the movements have been properly learned one can "loaf" in the water, relaxing between each movement and covering distance at good speed without much effort. It is only the beginner who thrashes around in the water and uses up more energy than he can produce. In order to swim correctly it is absolutely necessary to learn to breathe properly, and thus many people get the habit who would otherwise suffer from shallow breathing. The cold water acts as a general tonic and increases the resistance to "colds" and other diseases. The minimum of clothing is worn when swimming and the bather has at least a partial air-and-sun bath. All these things increase elimination and favor the production of energy, thus overcoming the two main causes of disease—toxemia and enervation. Of course, one can overdo swimming, like every-

Swimming
and
Symmetry



PHOTOGRAPH INTERNATIONAL NEWSREEL

Apparatus used at a swimming school to simplify the teaching, and to develop real swimmers in the shortest possible time.

thing else, but if properly employed it will be found of the greatest assistance in gaining and maintaining vigorous health.

Swimming may also come in very handy for saving one's own life or the life of another. Having learned to swim, the swimmer should next learn life-saving and the means of resuscitation. If one only knows how to float, or to keep up by making a few motions with the arms and legs, one may thereby be saved from drowning; but to be able to save another as well as oneself is much better. Many a good swimmer knows nothing of life-saving. A drowning person is often almost insane with terror, and the rescuer must know how to handle him. One will be more than repaid for learning this art by the feeling of satisfaction one gets from being able to help in an emergency. It also gives one confidence.

Health and life-saving are not the only benefits of swimming. It gives one courage and confidence, teaches self-control, makes one graceful, improves the carriage and general appearance and normalizes the weight. Of course in the latter case some attention must also be paid to the diet. The rhythmic movements of swimming not only educate the muscles and produce grace, but impress harmony and balance upon the mind. It would be difficult to find a sport with more advantages than swimming, and everyone would do well to patronize it.

There are various methods of teaching swimming, some instructors preferring one way and some another. However, all are now agreed that the old method of teaching the breast

Life-saving:
A Requirement

stroke first was wrong. The first thing to teach is breathing. After this the individual must be taken into account. It is generally well to start with the crawl stroke, but some may make out better by starting with the back stroke and some with floating. The method used will be determined by the inclinations of the pupil, his weight and strength and the degree of confidence. It is very important that the pupil have confidence, but this can generally be quickly developed by teaching breathing first. When one has learned to breathe out under water and has become acquainted with the buoyancy of the water, confidence is soon gained.

Learning to
Swim

It is best to have fairly warm water in which to learn, so that there will be no discomfort and resulting tenseness from chilling. It is easier to learn in salt water than in fresh, as the former is more buoyant. Unless living in a warm climate it may be well to start practice indoors, where the water can be heated and its depth definitely graduated. As soon as possible, however, the student should swim outside, whether in salt water or fresh, in order that he may become accustomed to the colder water and get the benefits of the fresh air and sunlight. Too many indoor pools are poorly ventilated and not sanitary. Practice opening the eyes under water while learning to breathe. To be able to see where one is going is both necessary and productive of confidence. It is well to protect the ears with rubber ear-stopples, so as to avoid the discomfort of water in the ear and to reduce the danger of infection. Many people have perforated ear-drums without knowing it, and this may permit water to enter the middle ear. Cotton in the ears is a poor substitute and not advisable. Ear protection is especially important if doing much diving. The bathing-suit should be neither so tight as to be binding nor so loose as to be baggy. It should generally be of wool, as this dries much more quickly and is warmer than other fabrics. The right kind of a suit adds much to the pleasure and profit of swimming. The question of a bathing-cap is optional, but if one goes in frequently it is well to wear one. Never swim immediately after eating. It is better to swim before, but if this is too inconvenient one should wait at least an hour, and better two, after a meal. Do not go swimming when already tired.

The question as to whether any artificial aids should be used in learning to swim will depend to some extent upon the individual. However, in most cases it is well to use wings for a time, as they add to the pupil's confidence and enable him to give separate attention to the use of the arms and legs. When the motions have been learned the air may be gradually let out of the wings until they no longer give any support. Never attempt to teach a person to swim by "throwing him in." It may result in drowning and will certainly lead to fear of the water and errors of form. It is not a method to employ with reasoning beings.

It is always well to have an experienced, sympathetic and persistent teacher, in order that one may learn as quickly and perfectly as possible. It is easier to overcome errors of form when starting, and if one has no teacher to point these out one will be at a disadvantage. Proper form may not be so important for ordinary swimming, but it certainly is if one intends to do any racing, and if one is going to do a thing it might as well be done right. If one pays strict attention and makes an earnest effort, it may take no more than three lessons to learn to keep up in the water. However, if one cannot secure the services of a competent teacher, or even if one can, the following directions will prove helpful.

Swimming
and
Breathing

As already stated, the first thing to learn is breathing. This is practically always taught in the same manner. The pupil stands in water about up to the chest, takes a deep breath quickly through the mouth, then closes the mouth and bends the knees sufficiently to completely immerse the head, at the same time breathing out through the nose under water. When the air is all out the legs are straightened so as to lift the head out of the water, another breath is taken in through the mouth and again breathed out under water. This is repeated a number of times, then there is a pause for rest. One should avoid haste and excitement, breathing smoothly, regularly and at moderate speed. After a few trials one may start opening the eyes under water.

The next thing to try is the "dead man's float." The arms are extended and the body bent forward over the water, while a deep breath is taken and held. The body is then allowed to come to rest on the water following a push-off with the feet.

One can float in this extended face-down position as long as the breath can be held. It helps to give confidence in the buoyancy of the water and to accustom one to the horizontal position, with feet off the ground. To return to the erect position, the knees are drawn up and the arms spread to the side with a sweep. This lifts the upper body and the legs can then be extended to touch the ground. It is as important to know how to resume standing as to know how to lie on the water.

When these two things have been learned one is ready to take up any stroke one desires to learn, or to float on the back. The principal strokes used at present are the crawl, the side stroke, the back stroke and the trudgeon. The breast stroke is taught last, if at all, as it is the most difficult and the least effective. Stunts in the water, special racing strokes and life-saving may be taken up by the advanced pupils.

The Crawl Stroke.—This is probably the most popular stroke at present and deserves to be so. It gives one speed without great exertion, so that distance can be covered. However, it is not the most restful stroke, so it is used chiefly for sprinting. The position assumed in the crawl stroke minimizes water resistance while at the same time it takes full advantage of its buoyancy. Correct breathing is very important in this stroke and should receive careful attention.

As one can swim the crawl without using the legs at all,



Floating, preparatory to starting the back stroke: hands by sides, legs straight, feet together, chest up, head back. Breathe smoothly, regularly and at a moderate rate, and avoid excitement.

The Crawl Stroke

1378 SWIMMING—ARMS AND LEGS

Movements in Swimming

it is well to start practice with the arm motion and to do this on land, standing with the feet together and body bent forward as it would be on the water. The arm motion is a flailing one, using the left and right alternately. The fingers are kept together and the elbows well out from the body, and the wrist is hooked as the hand presses back against the water. As the left arm goes back the left shoulder is lifted and the face is turned to the left. The lift allows the face to come out of the water, so that a breath may be taken in through the mouth. As the left arm goes forward by the action of the shoulder muscles, its own muscles are relaxed, the arm is out of the water and the elbow is in advance. The face is now turned downward under water and the air is exhaled through the nose. While the left arm is going forward the right arm is going



Forms of Back Stroke. From position shown in photograph on preceding page, any back stroke may be started. A common one is performed by bending the arms and legs outward at the elbows and knees, bringing the hands well up under the arm pits, and keeping the soles together. From this position they are shot straight out as here shown. They are then brought back to first position with a snap.

back through the water with shoulder depressed and wrist hooked. As it reaches the end of its backward stroke the shoulder is lifted, the face comes out of the water and the arm is started forward. The top of the head should be kept down and the mouth up. All these motions are performed smoothly, with no pause. Whether a breath is taken at every stroke, every other stroke, or every fourth stroke, depends upon the speed of the arm motion. After the shoulders have been loosened up and the motion learned by the land drill, the same may be tried in the water while supporting the lower body and legs with water-wings. The wings are placed below the ribs for this purpose. When able to breathe and perform the arm motion properly, the leg movement may be started.

Breathing

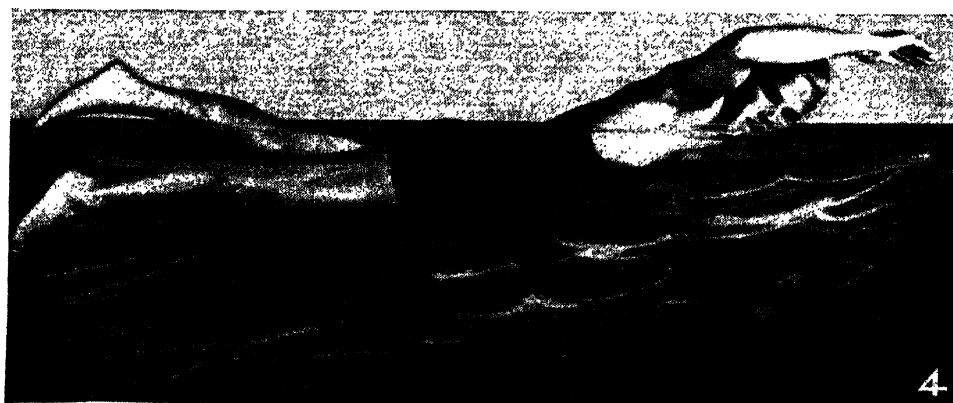
There are several kicks which may be used with the crawl, but the one usually employed is the flutter kick. This is practiced while supporting the body and the extended hands on water-wings. The kick is a sort of thrashing movement performed from the hips, with legs extended but knees limp. The up-and-down motion gives a short snap of the feet together. The number of leg-motions in the crawl stroke exceeding the number of arm-strokes, the leg-strokes are timed to meet the preference of the swimmer. In short-distance swimming especially, the leg-stroke assumes a sort of "flutter" motion.

After one is able to make progress through the water with water-wings using the leg-stroke alone, the arm and leg motions may be combined, using one pair of wings under the abdomen. It should now soon be possible to dispense with the wings, for the well-learned arm motion and breathing will keep one up and going even if the leg motion is not perfect.

The Side Stroke.—There are several varieties of this stroke—the side underarm, the side overarm and the double overarm. The latter is almost the same as the trudgeon. The first two are the most used, the underarm for a restful stroke and the overarm for greater speed.

In the underarm stroke start on the right side, with the right arm extended in advance of the head and the left hand by the shoulder. Push off and swing the right arm down to the leg, at the same time advancing the left arm. As the right arm is recovered the left pulls down and back through the

The Under-arm Stroke



THE CRAWL STROKE. (For description see page following.)
1380

THE CRAWL STROKE

1. The beginning of the crawl stroke. As the left arm is extended forward, the right arm is brought downward and back. The hands are cupped. The legs are kept together except below the knees, the leg stroke being performed by the feet and lower legs. The body is kept completely under water except when the head is turned upward to obtain breath.
2. Continuing the crawl stroke. The left arm is "digging in," pushing down and back with the cupped hand, while the right arm is bending and lifting preparatory to coming forward out of the water. The head begins to turn toward the right. The right elbow should be slightly higher and the forearm slightly trailing.
3. As the right arm is brought forward with the motion of the child's crawl that gives the stroke its name, the left arm continues its stroke downward and backward.
4. Here the right arm is brought out upon the surface of water, and with the finish of this second beat on the part of arms, breath is taken on the side most convenient, the face being brought up to permit mouth and nostrils to clear the water as the body turns with the overhand arm stroke. There may be as many beats of the feet to each breath as the swimmer proves most effective in his case.

BREAST STROKE

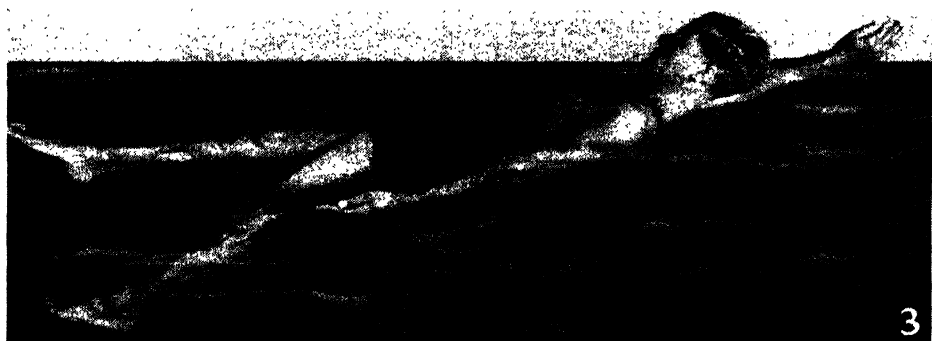
(Illustration on following page)

1. First position of the breast stroke; arms extended with palms cupped outward; legs loosely trailing; mouth under water.
2. Continuing the breast stroke. The arms are being drawn outward and backward in a full sweep so as to propel the body forward as the legs are being drawn up preparatory to the kick. As the arms reach the full backward position the legs are spread, and as the arms recover forward the legs are snapped together so as to continue the forward motion. As the arms go backward the mouth is lifted out of the water so that a breath may be taken.

ALTERNATE OVERARM BACK STROKE

(Illustration on following page)

3. The left arm is shown about to be lifted straight out of the water, while the right enters the water, which it scoops in the cupped palm in the direction of the feet. The hands are kept equidistant. As the arm is about to rise out of the water, a short scissors kick is given, bringing the feet together.
4. Other end of stroke shown in 3. Immediately the kick is given, the leg on the side of the ascending arm goes upward but not out of the water, and the other comes downward, preparing for another kick.



BREAST AND OVERARM BACK STROKES. (For description see preceding page.)

water and the legs are kicked at the same time. Here there is a pause, as the body glides through the water, and then the stroke is repeated. The kick used is the "scissors" kick. This consists in bending the under leg backward and then snapping it forward to meet the upper leg, so that the top of the foot will strike the water a vigorous blow. There is a slight spreading of the legs and the upper leg can assist in the snap together. The movements should be timed by count so that they will be made smoothly and slowly. A one-two-three count can be used by sweeping the under arm down on one, pulling back with the upper arm on two and kicking with the feet on three. This is faster, but more tiring. It is used more with the overarm stroke. This is the same as the underarm, except that the upper arm is brought out of the water as it goes forward. As there is less resistance to this motion, it can be performed faster. The head should always be kept down and the feet up, so as to get full benefit of the buoyancy of the water. Breathing is performed as usual; in through the mouth and out through the nose under water. The breath is inhaled at the conclusion of the pull with the upper arm, just as it is coming out of the water, as this pull lifts the body and turns the face up. When swimming the underarm stroke it is possible to keep the face constantly above water, so that breathing is easy; but it is preferable to use the regular method, so as to maintain good timing and keep in practice.

Having learned this stroke on one side, it should be practiced on the other, so that a change can be made when tired.

The Back Stroke.—There are different varieties of this stroke also, but the double overarm is the one generally used. The back strokes are easily learned and quite restful, so that they can be used for long distances, and all swimmers should be acquainted with them. Some teachers prefer to teach them first, especially to women who can float easily.

In the double overarm one starts from floating position with arms at the side and legs extended. A breath is taken through the mouth, and then held as the arms are raised out of the water and extended overhead. This movement causes the face to be immersed. Then the arms, with wrists hooked, are brought down to the sides with a wide sweep while the breath is exhaled through the nose. This stroke lifts the face

out of the water again, so that at its conclusion another breath can be taken through the mouth. The kick used is the "frog" kick and is performed as the arms are being brought down to the sides. The frog kick is executed by drawing up the knees flatwise and parallel with the water surface, spreading the legs gently. Then the legs are extended and brought together with a snap, causing the body to shoot forward. The snap is followed by a pause, so as to get the advantage of the propulsive power of the kick. In variation of this stroke the arms may be lifted out of the water with elbows bent and palms facing, or arms stiff and hands back to back, or by a loose, overlapping, curling movement. The wrists should always be hooked.

The Trudgeon Stroke.—This is a sort of combination of many strokes. The arm motion is similar to that of the crawl, but it is performed more like the double overarm; that is, the swimmer works more on one side than the other and there is a slight roll. The kick may be either the scissors or the frog kick, usually the former. This is delivered while the under arm, usually the right, is pulling through the water. Breathing is the same as for the side overarm, but the breath is usually taken only every second stroke. When the motions have been well learned the trudgeon will be found an easy stroke for a long-distance swim, but the back stroke is still to be preferred when speed is not a factor.

The Breast Stroke.—Only a brief description of this will be given, as it is little used now. Starting position is with hands in front of the chest, backs together and palms facing out. The arms are then extended forward and swept back in a wide circle to the side, then recovered to first position. The frog kick is used, the knees being drawn up when the arms are in starting position and the kick made as they are extended. One breathes in through the mouth as the arms go back and out through the nose as they go forward.

Floating.—Every swimmer should do his utmost to learn how to float, as it enables one to rest on the water. Anyone can learn to float in salt water, but some find it difficult in fresh, especially heavily-built men who are so solid that they sink easily. By heavily-built I mean heavy in bone and muscle, not fat, as fat people float easily. Floating on the

The
Trudgeon
Stroke

The Breast
Stroke

Floating

face has already been discussed. The main thing about floating on the back is to keep the chest up and the head back and to breathe deeply and regularly. It is the air in the lungs which keeps one up. The head, being heavy, should be kept well under water. All the muscles should be relaxed. If one finds difficulty in floating, *sculling* can be tried. Anyone can keep up by this method with very little exertion. It consists merely in a revolving movement of the hands and wrists, with small scooping motions. To regain the feet after floating, bring the arms to the front, using the hands as scoops to pull the body forward. As it goes forward the legs will be forced down.

Treading Water.—This enables one to maintain a perpendicular position in the water. It consists of a rapid running movement with the legs, the strokes being up and down rather than forward and back. The hands are usually kept palms down on or near the surface of the water.

Treading
Water

Racing.—The crawl stroke is generally used for racing, but most swimmers have little variations in style which seem to meet their particular needs. Experience and a good coach will assist here. Training for swimming races is much the same as for running races. In fact, some running will help the swimmer if he lacks endurance. The training of a sprinter will naturally be different from that of a long-distance swimmer, but vitality and endurance are always essential. Good style and form are the primary requisites, as without them too much energy will be expended for the results secured. Be content to perfect your strokes before thinking of speed or distance. Diet is especially important for the swimmer, as a little layer of fat will help to make one smoother and more buoyant and will protect from the cold; yet nothing will interfere more with progress than overeating. A carefully balanced diet will give the necessary tissue, because the demand for this will be created by the swimming and the body always answers a legitimate demand if it has the elements to work with. There is no necessity for overeating. Both stomach and colon should be empty before a race.

For a long-distance swim the body is generally heavily coated with grease, as it protects from the cold. Goggles are also worn, especially in salt water, so as to prevent irrita-

Greasing
Body for
Swims

tion of the eyes from the long immersion, the splashing of the water and encrusting with salt. However, long-distance races cannot be recommended from the health standpoint, and most people would do well to confine themselves to the shorter distances. A meet generally includes 50, 100, and 220-yard races, 150 yards on the back and a relay-race. The one and two-mile distance races can be added; also diving, life-saving and water polo.

Cramps.—Cramps seem to be the bugaboo of inexperienced swimmers, so that a few words in regard to them may not be amiss. Experienced swimmers never think anything about cramps, as they know they are not dangerous. Drowning laid to cramps is really due to fright, for a person can keep afloat with almost any kind of a cramp if he keeps his head. As cramps usually affect the calf muscle, they will not interfere with swimming the crawl stroke or floating. If a cramp is felt, swim to shore in whatever manner is the easiest, get out and *apply heat and friction*. If the swimmer is sufficiently confident and at home in the water, he can often “rub out” the cramp without coming to shore. At any rate there is no need to get excited and swallow a lot of water.

Cause and
Remedy
of Cramps

The immediate cause of a cramp is some interference with the circulation or nerve-supply. This may be due to excessive cold, unusually long immersion or overexertion; but back of these are poisons in the system and lowered vitality due to improper diet and other wrong habits of living. A swimmer who has trained properly does not get cramps, because he has a good circulation of pure blood, and therefore the vitality to resist adverse conditions in the environment. George H. Corsan, the well-known swimming instructor, says that a heavy protein diet, especially if it be animal protein, is particularly likely to produce cramps, and there is no doubt that he is right. Such a diet produces a lowered alkalinity of the body, which irritates the nerves and renders them hypersensitive, also making the body more susceptible to fatigue. So the unpleasantness of cramps may be avoided by proper diet and training.

Life-Saving.—Swimming may seem difficult to the beginner, but it is simplicity itself in comparison with life-saving. In order to be able to rescue anyone from the water, it is

necessary to be able to swim several different strokes, to have complete confidence and to know how to handle the drowning person. It seems that persons in danger of drowning do everything possible to bring it about, instead of preventing it. If a rescuer appears, they seize him in any place that is handy and may even choke him if he does not know how to defend himself. Occasionally both persons are drowned, because of the unreasoning terror of the non-swimmer and the swimmer's lack of practice. All swimmers should practice life-saving, as it will improve their own swimming ability and prepare them for emergencies.

Points on
Rescuing

When attempting to rescue a person always approach him from behind if at all possible. He then has less chance to seize you. If he is reasonable, turn on your back and swim with the frog kick, while holding his head above water with your hands. If he thrashes around a lot, pass one arm around his body beneath the armpits (from behind) so as to hold him higher, then swim with your other arm and the frog kick. If he is very violent, you will have to grasp him with both arms and depend on your legs alone. This will be more difficult; but by keeping the head well back and the mouth well up and breathing carefully, one can pull through. *It is always easiest to rescue a person while swimming on the back.* The side stroke can be used if the one being rescued will keep quiet and allow you to support him by a hand beneath his armpit. A swimmer who is merely tired can be brought in by having him place his hand on your shoulder from a position behind you, while you swim the side stroke.

The greatest danger arises when it is necessary to approach the drowning person from the front, or when he turns to face you in spite of your best efforts. Then it is necessary to look out for his hands. His legs will seldom cause any trouble, as any kicking he does will help keep him afloat and he will not be likely to try to grasp you with them. If he does, it will be about your body, which will not interfere with your swimming on the back. Any general grip with the hands can be broken by placing the foot against the other person's chest or abdomen and pushing him away. One can often get free of a grip about the neck by ducking the head and raising the arms while keeping the elbows flexed. A grip of the wrists

**Life-saving
Hints**

may be broken by an outward twist. Pushing the drowning person under water may cause him to loosen his hold. Any means is legitimate for breaking loose if the drowning person's grip interferes with the rescue work. Get behind him by some means as soon as possible and then proceed as directed above. Take your time and do not get excited or frightened yourself. A person who is still able to put up a fight when you reach him can be resuscitated, even if he should be under water most of the time while you are getting him out. Persons have been resuscitated after half an hour in the water. If a boat is coming, devote your efforts merely to keeping up and do not try to reach the shore. If you have to dive for the body, get down deep so that you can look up against the light. *Bodies will usually be found not far below the surface.* If you are on bottom at any time, you can reach the surface more quickly by giving a strong push-off with the foot, than by merely swimming upward. Weeds and other obstructions present their own problems, and the rescuer must be able to think clearly and decide quickly. Herein is shown the value of previous practice and of being in condition.

See section on *First Aid*, Volume VII, for directions for resuscitation. See also *Diving* and *Water Polo* in this volume.

**Tag, a Run-
ning Game**

TAG.—There are a great variety of tag games, though the fundamental idea is the same in each case. One player is "It" and opposed to all the other players. His object is to "tag" one of the other players in spite of the obstacles placed in his way and thereby cause that player to become "It." All true tag games include much running, especially for the person who is "It."

Some tag games can be played indoors, but the great majority are played outside, thus giving the advantage of fresh air. The running is the chief exercise, though in certain games such as ankle tag, ostrich tag and turtle tag, much body-bending is required and all the muscles are used to some extent. In none of the tag games are any powerful muscular contractions required, however, so that they are all included under the head of constitutional exercise, either mild or medium in severity. This gives a wide field of usefulness to the tag games and is an important point in their favor. Such games can be played by either sex or both together, by the young and

old, and even by those who have mild chronic diseases. They are much used at picnics and in health resorts and gymnasiums. Children especially are fond of them, but they have enough mental interest to make an appeal to adults as well. This is another point in their favor. Still another is that in most cases no equipment is required. While simple and easy to play, they demand quite a variety of movements, with plenty of deep breathing, and at the same time they emphasize the play spirit. For all these reasons they can be highly recommended. A short description of a number of tag games follows.

Plain Tag.—The person who is “It” chases any other person or persons and endeavors to touch him or them on some part of the body. The person touched becomes “It.” Speed and agility are the chief requirements for this game. Plain Tag

Ankle Tag.—In this game, a man, in order to escape being tagged, must grasp another man by either ankle. The man whose ankle is held, however, is liable to being tagged unless he has hold of someone’s ankle. This leads to much pulling and tumbling around, as well as to running. Ankle Tag

Ostrich Tag.—In order to be safe the player must be standing on one foot with opposite arm under knee of same side and hand grasping the nose. The one who is “It” is privileged to take one push at any man in this position, and if he breaks his position he is subject to being tagged until he is again in the safe position. This does not call for quite so much running, but does require good balance and muscular control. All muscles are used. Ostrich Tag

Turtle Tag.—The player who is “It” may chase any other player. The latter may gain immunity from tagging by dropping to the ground upon his back with feet and hands held upward, turtle fashion. Once out of this position he may be tagged. The man who is “It” has the privilege of running away four paces and returning, and if the man on the ground cannot in that time rise and again resume turtle position, he is subject to pursuit and tagging. Turtle Tag

Lock-Arm Tag.—Players are arranged in pairs in a circle. Those in each pair lock their inside arms and place the hands of their outside arms on hips. There should be a distance of at least three feet between each pair. Two players are selected Lock-Arm Tag



In gripping a tennis racket, hold firmly near end of handle.

Black and
White

one of whom is "it," the other being pursued by the first man. The man pursued can link arms with either member of any pair in the circle, whereupon the player at the opposite end of the set of three men is subject to tagging. All endeavor to avoid being joined by the man who is pursued, players being allowed to run through or around the circle in any direction. A man upon being tagged may immediately tag back, but after he is attached to any other player may neither tag nor be tagged, unless a third player joins them. This game calls for the use of the arms much more than most tag games.

Black and White.—Some equipment is required for this game. There must be sufficient space to allow the placing of two base-lines, parallel to each other and fifty feet apart. A center-line is placed mid-way between the two base-lines. A four-inch wooden or pasteboard disk, white on one side and black on the other is also required.

Players on opposing teams line up back to back on each side of the center-line with a space of six feet between the lines. One team is called "White," the other "Black." The disk is thrown into the air by someone who is not playing. If the white side turns up, the "White" team chases the "Black" team across its base-line. Every man tagged by the members of "White" team, joins that team. The two teams line up as before, the disk is again thrown, and whichever color comes up, the corresponding team endeavors to tag its opponents before they can run across their base-line. The team having the largest number of players at the end of a game wins. Speed is the chief requirement for this game, and, therefore, provides a great deal of exercise.

TENNIS.—Tennis ranks among our most popular games. Almost anywhere you go you will find tennis-courts, and the

game is also widely played on floors indoors. International competition is well established and commands great interest; yet it has not been commercialized. In its modern form it is only about 50 years old. Tennis is played on grass, and hard-surfaced courts, chiefly the last. A few places have cement courts, but they are not advisable, being dangerous in case of a fall and rather tiring to play on. The earth courts require considerable care and attention, but are much the best for playing.

Tennis is an excellent game in every way. It is usually played out of doors and insures to both players and spectators an ample supply of fresh air and sunlight. It can be played at any season, rain and snow being the only weather features that interfere. Moisture is the great enemy of tennis rackets, balls and even the court. Tennis may be played easily or vigorously as desired and thus adapted to the needs of young and old, the weak and strong, the amateur and the expert. It provides genuine all-round exercise of the constitutional variety. It may appear that the left arm is somewhat neglected, and in truth it secures less exercise than other parts, but it is used more than would appear from merely watching a game. The legs get the most exercise on account of the constant running and jumping, but the body muscles and those of the arms get plenty. The player receives the good effects of both contraction and stretching movements. The more expert one becomes, the faster will be the game played and

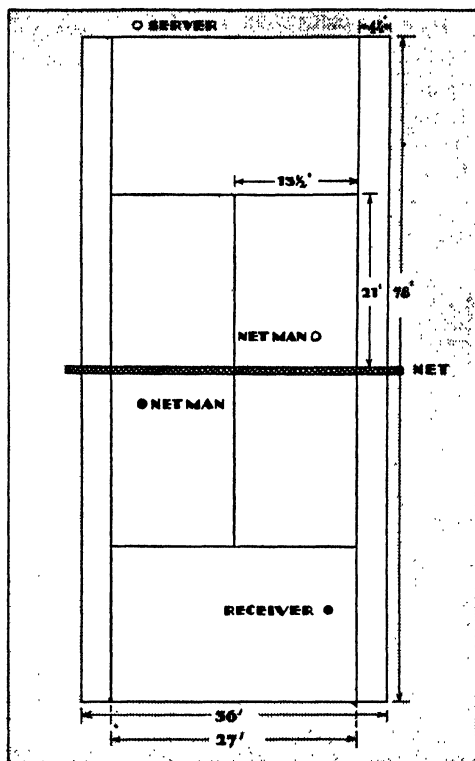


Diagram of a tennis court showing the positions of the players in doubles.

the more exertion required. To play effectively in a tournament requires the very best physical condition. Learning to play tennis, which takes considerable practice, will develop speed, agility, endurance and quite a degree of actual strength, even though there may be no great bulk of muscle. Since it is a game of skill as well as of strength and endurance it is full of mental interest, which is another health advantage, as it helps to keep one playing regularly.

Serve In Tennis

One who desires to excel at tennis must be willing to practice persistently and to give due attention to all training rules. Serving the ball requires strength as well as speed and control. Recovering a ball requires good sprinting and jumping ability as well as perfection of stroke and the brains to outguess an opponent. The nerves must be steady and the muscles must be quick to act. All this requires right living in every way, as well as practice of the game. Tennis demands much of a player, but it also gives much.

Tennis.—Equipment.

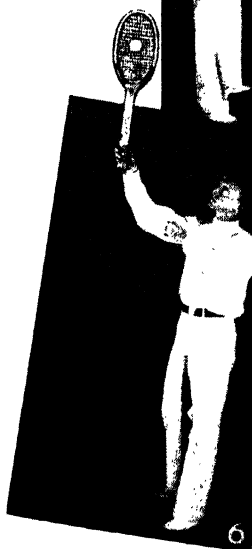
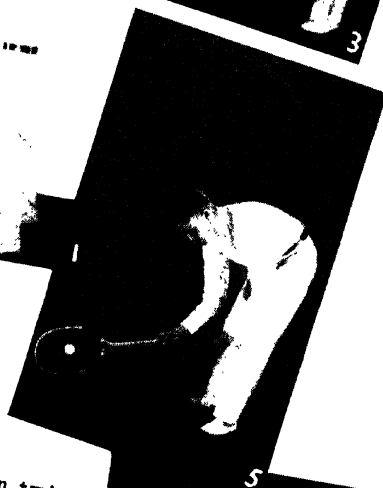
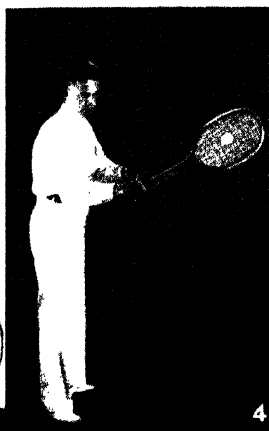
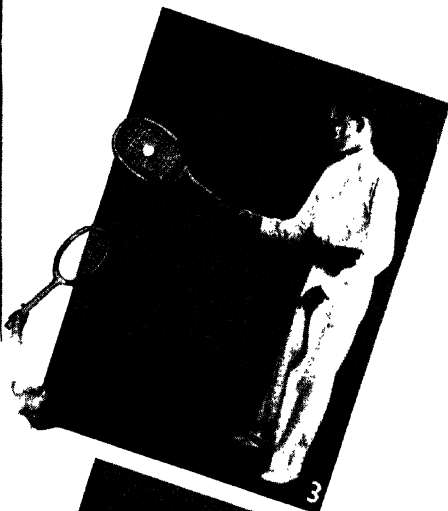
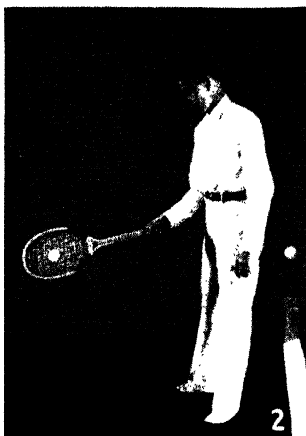
The Tennis Court

The Court: This may be laid out on any level stretch of ground or turf, but a specially built court with broken stone foundation and earth surface is to be preferred. The size is 78 by 36 feet. White lines mark the boundaries. Four and a half feet inside the side-lines an inner side-line is drawn, making a smaller court, 27 feet wide, for use in playing singles. The court is divided in half by a center-line, above which is a three-foot net, stretched tightly from side to side. Each half of the court is divided again by a service-line, drawn parallel to and 21 feet behind the middle-line. The inner court thus formed is divided in half lengthwise by another line. Back-stops and partial side-stops are a great convenience but not essential.

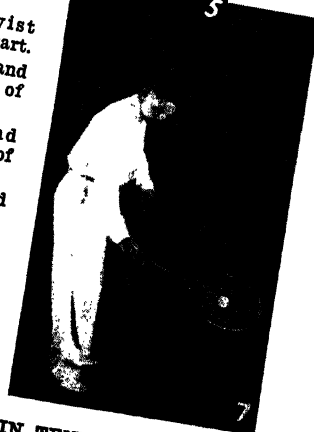
The Ball: Rubber, with woolen cover, air-inflated, 2½ inches diameter.

The Racket: Wood, with oval frame about 8 inches wide and 12 long, with handle 15 inches long. The frame is strung very tightly with a network of catgut. Sizes and weights vary somewhat according to individual preference. Metal rackets are also made and are not affected so much by the weather.

Uniforms: No item of distinctive character except shoes. These should have rubber soles and no heels.



1. American twist service—the start.
2. Low flat forehand drive at middle of swing.
3. High forehand drive at middle of swing.
4. High backhand volley.
5. Half-volley, or pick-up.
6. Regular or slice service.
7. Low backhand drive, middle of swing.



SERVES AND RETURN STROKES IN TENNIS

The Players.—Tennis may be played individually or “doubles.” In a doubles game two play on each side, one close to the net and the other near the base-line. In a singles game the player must cover the entire court himself, but must always serve from the base-line.

Playing the
Game

The Game.—The object is to serve or return the ball so that opponent cannot return it safely. This scores a point for the side making the last safe hit. The score is counted as follows: first point, 15; second, 30; third, 40; and fourth, the game. If the score is tied at 40, however, it is called “deuce,” and one side or the other must make two points in succession to win. The first of these points is called “advantage.” If one side has advantage and then loses a point, the score goes back to deuce. If the score is 15 or 30 for both sides, it is called 15 or 30 “all.” If one side has a point and the other none, it is called 15 “love,” love meaning nothing. If a player wins a game without his opponent scoring, it is called a “love game.” Tennis is played in “sets,” the first side to score six games winning the set. If the score is even at five games, two games in succession are necessary to win the set, the same as in scoring after deuce. Matches are usually won by winning two sets out of three.

Technique
of Tennis

The game is started by one player “serving” the ball to his opponent. The server stands behind the base-line, throws the ball into the air, and then drives it with his racket over the net and into the front-court diagonally opposite him on the other side. If it lands outside the bounds of this court, or hits the net, it does not count. The server is allowed two balls. If he fails to get either over safely, his play is called a “double fault” and the other side scores a point. After each point scored the players change from one side of the court to the other. If the server gets one of the balls over safely and his opponent fails to return it safely, the server scores a point. If a ball hits the net, goes out of bounds, or makes two bounces before it is hit, the point is lost by the side making the error. A ball which has just been served must be hit on the first bounce. Other balls may be hit on first bounce, or while still in the air. In the latter case the stroke is called a “volley.” If a server makes a good serve which is safely returned by opponent, after which server fails to return the

ball properly, his opponent scores the point. The ball always continues in play until one side or the other fails to return it safely. After a game has been won by either side, the one having had the service starts to receive and the other side serves. The service thus changes hands after every game. The sides change from one end of the court to the other after each set.

The doubles game is played the same as the singles. Of the two players on a service side, one serves and the other plays up close to the net ready to return balls. Having made the delivery of the ball the server generally moves up in the court toward the net. The other side may place both players near the net, both in the back-court, or one in each place. The business of both is to return balls. They alternate in receiving the server's delivery. The players on each side take turns from game to game in serving. The outside boundary-lines are employed. The important point for every player to remember is to *keep the eye on the ball*.

TRACK AND FIELD ATHLETICS.—By track athletics are meant specifically races run on a cinder track, but as generally used the term includes any kind of running races, even cross-country and the Marathon. By field athletics are meant those events that take place on the field enclosed by the track, among them being the various jumps—including pole-vaulting—and the throwing of weights—including the discus and the javelin. All these contests are included in the athletic “meet,” and the contestants are grouped as “track and field” teams, even though each man competes individually and sometimes against members of his own team. A team may enter two or three men in the same race, or in a jumping or weight-throwing contest. A meet may occupy more than one day and gives an opportunity for the display of all-round athletic ability. The pentathlon, in which one man competes in five different events, including running, jumping and some form of weight-throwing, is very popular, and one must be an all-round athlete to win.

Track and
Field Sports

The usual track and field meet includes the following events: the 100 and 220-yard sprints; the 440, 880-yard and one-mile runs; the one-mile relay; the 120-yard hurdles; perhaps walking races at various distances; the running jumps;

the pole-vault; putting the shot and throwing the hammer. Sometimes the discus and javelin are included and longer running races.

TUG-OF-WAR.—There is not much war in tug-of-war, but there is plenty of tugging. This is a contest rather than a game, and is a test of strength and endurance. Weight is a factor to be considered, however, and teams should be as evenly matched as possible in this respect.

Tug-of-war is mainly for those already in good physical condition. It puts a considerable strain on the heart and lungs, or rather it requires considerable exertion on the part of these organs, and unless one is accustomed to exercise it would be better to avoid it. For those who have had a little preliminary training, however, tug-of-war is excellent for hardening and toughening the entire body. All the muscles are used in the tremendous effort to pull with every ounce of strength, and this pull must be continued for several minutes. Naturally this requires strength, endurance and determination. The exercise is developmental rather than constitutional, and those who indulge regularly in such contests will find their muscles increasing in both bulk and power. It is well to be a little cautious about straining. In the enthusiasm of a contest one may try to do more than the strength justifies and thus come to grief. It is better to lose a few contests than to be incapacitated. As the strength increases the enthusiasm may be allowed full sway.

Those who are particularly interested in this sport would do well to give attention to diet, sleep and every factor which increases the endurance, for this is the quality that wins such contests. Weight is of value, strength is very necessary, but without the endurance to make the most of the strength and weight results will be very unsatisfactory. Tobacco should never be used, and deep breathing of fresh air should be practiced frequently.

A heavy rope should be selected, so that the contestants can get a good grip on it. A handkerchief is knotted about the center of the rope to serve as a guide. Each team lines up along the rope, getting a good grip upon it, and in such a position that the handkerchief is directly over a mark on the ground. At a given signal each team begins to tug, endeavor-

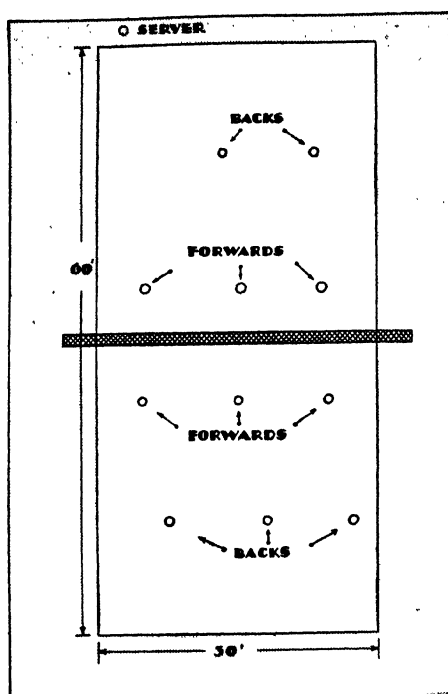
ing to pull the other team along so that the handkerchief on the rope will pass a certain distance away from the mark on the ground. This may be one, two or three feet. The team which first succeeds in pulling this distance wins the contest. If it is deemed advisable the bouts may be timed in order not to exhaust the contestants. Two or three minutes is sufficient. The team having the advantage when time is up wins that pull. A contest may consist of three pulls or bouts, the best two winning. A team may consist of any number of members from one up, but one is seldom used and six is considered about right. For practice, of course, one may pull against one opponent and several ropes may be used, but each team should also practice pulling together, for united effort is very important. The last man on each team is called the "anchor," and he generally loops the rope around his waist over a leather belt, in a loose twist so it can be easily slipped or tightened as he takes in slack. When the game is played out of doors the anchor frequently "digs in"—makes holes for his heels. Indoors cleats are often fastened to the floor for the men to push against so they will not slip or slide.

There is little if any science to this contest, but there is plenty of excitement, mental interest and rivalry, so that there is no danger of anyone becoming bored and all will be willing to work hard in training.

VOLLEY-BALL.—Volley-ball is one of the best all-round games that is played today. It has action, interest and flexibility, and is easy to learn. The Y.M.C.A.'s, Y.W.C.A.'s, playgrounds and similar institutions have been chiefly responsible for the development and increased popularity of the game. It is not so much a school and college game as are baseball, football, basket-ball, etc., though it is played by them. In fact, it is played wherever athletics are in favor.

From the health standpoint it has no disadvantages except that it is often played indoors. However, outdoor courts are becoming more numerous, so that the indoor ones are used mostly in bad weather. The fact that it can be played either out or in makes it an all-year game. And not only is it an all-year game but it is a game for all. It can be played by young or old, male or female, the strong or the weak, and can be made fast or slow, strenuous or easy, scientific or primitive.

**Volley-Ball a
Muscle-
Builder**



Plan of a volley-ball court, showing the positions of the players when six are on a side.

Simplicity of Volley-Ball

whether they are "dubs" or experts. Being easily learned and fairly easy to play, it is particularly popular with the "dubs." Women like the game, because there is very little physical contact among the players and practically no chance of injury. Children like it because of its simplicity and because so many can play it.

As for action there is scarcely a muscle of the body that is not used. The arms and legs do the most work, but there is plenty of bending and twisting of the neck and body. One must be on the alert all the time, ready to jump and run in all directions and ready to shift from underhand to overhand, or from one-handed to two-handed playing. The arms are held above the head a good part of the time and this favors proper posture. One gets stretching as well as contraction of the muscles. Volley-ball is constitutional exercise. It may be made quite strenuous, but as the ball is light and the playing space small, the exertion is moderate even in a fast game.

Its adaptability thus gives it the widest possible use. Even the official rules are not difficult to learn, and when playing merely for recreation it is not necessary to be thoroughly familiar with or to carefully observe them. This fact usually appeals to persons who are not especially interested in athletics as they do not have to exert themselves mentally to any great extent. Of course, the more scientific a game is made the more mental interest it has, but most players seem to be sufficiently interested in volley-ball,

Plenty of endurance is needed, however, for speed and alertness must be maintained throughout the entire game. Good eyesight and muscular coordination are also of value. Playing the game will do much to develop all these qualities, but it is best to take some outside training if one wishes to excel. Sprinting, jumping, and hitting the ball against a wall are very helpful. Due attention must be given to diet, sleep and all training factors in order to keep in tiptop shape. A volley-ball team may often win and lose games in a seemingly unaccountable manner, but this can almost always be traced to the team's condition. Nerve-energy is needed, and this can be obtained only through right living. Thus the game serves as an incentive to health-building. It would be a good idea for every family to have its own volley-ball court in order that all its members may have both opportunity and encouragement to keep fit. It is easy for men and women to play together, and with proper handicaps children can play with adults if desired. No very elaborate equipment is required for the game and it can be played anywhere that a net can be set up. The following data will give an idea of its requirements.

**Volley-Ball
Require-
ments**

Volley-ball.—Equipment.

The Court: May be grass, gravel, earth or the wooden floor of a gymnasium. Size 60 by 30 feet, with 15 feet of head-room. The boundaries are best marked with white lines and also the center-line over which the net is placed.

The Net: Should be 3 feet wide by 35 or more feet in length, so as to reach from one side of the court to the other. It is stretched tightly between uprights or walls at a height which will bring the upper edge 8 feet above the ground. This height may be lowered 6 inches for women, or 12 inches for children.

The Ball: Leather-covered, air-inflated rubber bladder, 26 to 27 inches circumference and 8 to 10 ounces weight.

Shoes: It is well to wear rubber-soled shoes so as to avoid slipping.

The Players.—The game can be played with only one on a side, but as a rule four or more participate. The official number is six for men and nine for women. Outdoor courts are often made larger so as to accommodate more players, but

1400 VOLLEY-BALL—THE GAME

if more than nine play the game becomes rather unwieldy. The team of six is composed of right, center and left *Forwards*, right, center and left *Backs*. For the team of nine right *Center*, *Center* and left *Center* are added. The players are arranged in two or three lines of three each.

Playing the
Game

The Game.—The two teams toss a coin to determine which shall serve first. The right back of the team winning the serve takes the ball, and while standing behind the end-line of the court bats it with his hand over the net anywhere he desires into opponents' court. The ball must not touch the net or go under the net on a serve, or it is "side out" and the other side has the serve. When the serve fairly reaches opponents' court the latter make every effort to return it without its touching the floor. This is generally done by having one player stop the ball (but without holding it), pass it to another player and he to another, who returns it over the net. However, the first man or any other may return the ball if he has a good opportunity. The object in both serving and returning is to place the ball so that it will be difficult for the other side to return it. The ball may be struck with one or both hands or any part of the body above the hips, but it must not be struck more than once in succession by any one player. Sometimes the rule is made that not more than three players may strike it before it is returned over the net. Team-work is an important part of the game. If the server gets the ball over the net without a safe return his side scores a point. If there is a safe return and the server's side fails to follow with another safe return, it is "side out." In other words, if the server's side fails to return or commits any faults or fouls, it is "side out," while if the receiver's side fails in any respect the server's side scores a point. Only the server can score. Other reasons for "side out" are catching or holding the ball, touching the net, reaching over the net, serving out of turn, off-side. Whenever the service changes from one side to the other the side getting the serve "rotates." This means that the players change their positions on the court, each one moving one position in the same direction as the hands of a clock. For example, the left forward and center forward move one position to the right. The right forward changes to right back position while right back and center back move to the left.

The left back moves up to the position left vacant by left forward. It is important that each player remain in his own territory except in case of emergency.

A ball is out of bounds when it touches any surface or object near the court, or goes outside the boundary-lines. The penalty is "side out" or point for opponents, depending on which side drove the ball out. If the ball on a return is caught by the net it may be recovered, provided the player does not himself touch the net or strike the ball more than once in succession.

An official game is usually 15 points. If the score reaches 14 even, however, one team must win two points in succession during the same serve in order to win. The game may also be played on time, using two halves of 15 to 20 minutes each. The side having the most points when time is up wins. The teams change courts after each game.

For an unofficial game the rules may be modified as desired by agreement beforehand. This is often done in games played by women and children. Whether or not the rules are closely observed, the health value of the game remains the same.

WATER POLO.—See *Polo, Water*.

WEIGHT-THROWING.—Weight-throwing, as a form of athletics, includes putting the shot, throwing the hammer and hurling the discus and javelin. The javelin is not much of a weight, but since the object is to see how far it can be thrown it classes along with the heavier objects. In women's athletic meets throwing the baseball is sometimes included.

Weight-
Throwing as
Exercise

Weight-throwing of some sort has no doubt been practiced since long before David slew Goliath with his sling-shot, but present-day methods are quite different from those of primitive times. Now the weights are carefully standardized and must be thrown in a certain manner from a circle of specified size. The contestants train for these events, as for the more active ones of running and jumping. The contest itself is the test, the training being the health-buiding part of the sport.

While one might think that weight-throwing would involve chiefly the arms, it really uses all the muscles of the body, especially throwing the hammer, where both arms are used. The present style of throwing requires one or more turns of

the body, and this uses the body and leg muscles. If one is going to succeed at weight-throwing, especially with heavy weights, every muscle in the body must be developed. For this purpose it is well to take special exercises, and practice the general training rules for some time before attempting any throwing. Even a 16-pound weight is not easily thrown, and such an attempt on the part of a weak person might cause serious strain. Developmental exercises should be used for all parts of the body, with special reference to the abdomen and back, as these are the parts most likely to be weak. Weight-lifting in moderation is good training for weight-throwing. Of course, if one is merely to throw the javelin or the baseball, it is not necessary to develop great strength, though obviously the man with the greater strength will throw farther if he have equal skill. While training to build up all the muscles, one could also practice throwing light weights, such as about five pounds, in order to develop good form. This is important, for only by throwing in the correct manner can the best results be achieved. Moreover, an infraction of the rules resulting from poor form may cause one to be disqualified or penalized. Throwing a weight is not such a simple matter as it might appear.

**Benefits of
Weight-
Throwing**

The health benefits resulting from training for weight-throwing are considerable, for the throwing is usually done out of doors; and since the entire body must be hardened and strengthened attention must be given to every phase of right living. This brings about a balanced development that is very much to be desired. At the same time it is not well to devote all one's efforts to weight-throwing, as some more active exercise involving running would add to the benefits received. Active games might be used for this purpose. Only the man who is naturally heavy of bone and muscle should attempt to train for the 56-pound weight-throw. Champions in this class have all been of the near-Hercules type. Weight-throwing would class among the developmental exercises, for which reason some constitutional exercise, such as active games, would help to balance it. For the heavier throws three times a week is sufficient practice, taking lighter exercises two or three other days. For the 56-pound throw three days' rest before competition is advisable. The throwing of the discus

and javelin can be practiced oftener if necessary, as they are quite light; but even here discretion must be used to avoid strain of the throwing muscles. The necessary strength can be developed by other exercises, the actual throwing being used mainly for increasing the skill.

Putting the Shot.—The official shot is a metal sphere weighing 16 pounds. It is made of cast iron, sometimes with a brass shell. Shots weighing 12 and 8 pounds are also made for high-school and grammar-school boys. The shot is “put” from the shoulder by a straight thrust, rather than thrown. Nevertheless the arm does not do it all. The shot is placed on the palm of the right hand, which is held on a level with the right shoulder, and must not be allowed to go below or behind the shoulder at any part of the throw. In order to get the strength of the body and legs behind the put, a hop and body-bend are included. In preparing for the throw the contestant stands near the back of the seven-foot circle from which the put must be made. The body is bent far to the right, the knee on this side being bent. The left leg is then drawn back and instantly snapped forward again, at the same time executing a little hop which brings the thrower near the front of the circle, but in the same position as before, with the body and legs bent, especially the right leg. Now, continuing the impetus gained through this

Putting
the Shot



PHOTOGRAPH UNDERWOOD & UNDERWOOD

In putting the shot good form demands a straight push-out from the shoulder, not an overhand throw.

hop, the put is made with all possible force from the legs up, thrusting out powerfully with the arm and leaping into the air with a half-turn, so as to get the power of the shoulder and body-twist behind the arm. The shot leaves the hand just as the arm is fully extended. The half-turn causes one to land in a reversed position with the right foot where the left one was. It is important not to lose the balance during this maneuver, because if any part of the body touches the ground outside the circle, the put will not be counted except as a try. Each contestant is allowed three tries. The entire put is made quickly, with great concentration of effort and generally with the breath held. In practicing, however, the movements should be done slowly until they become automatic.

Throwing
the Hammer

Throwing the Hammer.—This is more of a real throw than the shot-put. The “hammer,” however, looks much like the shot, except that it has a four-foot wire handle with a loop-grip. Either the single or double grip may be used, but the latter is probably the better, as both arms are always employed in the throw. The hammer must also be thrown from a seven-foot circle, and the same rules as to fouls apply as for the shot-put, with the addition of one limiting the area within which the weight must fall in order to be counted, because the accuracy of direction is much less in the hammer-throw than in the shot-put. For this reason it is well that the spectators should not be too close.

The thrower stands with his back in the direction in which the weight is to be thrown. The throw without turns of the body is practiced first. With the hammer resting on the ground to the right, a firm grip is taken on the handles and the weight is swung around to the left, back over the head and around to the front again. This is repeated three times with increasing momentum, and finally there is a hard backward pull and the weight is allowed to go backward over the left shoulder. The weight should swing low in front and high behind while gaining momentum. When this can be done well, the throw with turns can be practiced. First, swing as before, twice around the head, and as the hammer swings back behind you for the third time, turn around once quickly, facing the same direction as before and conforming to the momentum of the hammer. The centrifugal force of the hammer will help in making

the turn, but a pull upon the weight will also increase the momentum of the turn; then with a final tug the weight is let go over the left shoulder as before. As one becomes more expert, two and three turns of the body can be made so as to gain still greater momentum, as this naturally increases the distance of the throw. Be content to progress slowly, as the throw must be done just right or the weight will go wild and not be counted. Skill plus strength is what produces distance.

The
56-pound
Weight

Throwing the 56-pound Weight.—This is no child's play. Merely lifting a 56-pound weight requires some exertion, without swinging it around the head. It is very necessary that complete control of the weight be maintained at all times. The weight is of the same construction as the 16-pound except that the handle is short, consisting of nothing but a triangular grip. The seven-foot circle is used, and the same rules apply as for the 16-pound hammer-throw.

In starting the throw the same foot position is assumed as when throwing the lighter weight. The ball of lead is then lifted and swung back and forth between the slightly bent legs until a proper balance and control has been obtained. Then, as the weight swings forward, it is directed toward the right side, then swung to the left and the body-turn started by pivoting on the left foot. The weight is always kept behind one. One or two turns are made, increasing the momentum and getting the weight higher, until it is finally released as in the hammer-throw.

Throwing the Discus.—This form of weight-throwing comes to us from the ancient Olympic games, and will probably always be used for sentimental reasons if for no other. The famous statue "Discobolus" has made the discus more or less familiar to everyone. It is a disc of steel or wood with a brass center and rim, $1\frac{3}{4}$ inches thick in the center, tapering to a half-inch thickness near the edge and being $8\frac{5}{8}$ inches in diameter. The weight is about $4\frac{1}{2}$ pounds. It is thrown from a circle 8 feet $2\frac{1}{2}$ inches in diameter, instead of the usual 7 feet. The discus must fall within a 90-degree sector marked out on the ground in front of the circle. It is a foul if any part of the body touches the ground outside the circle while the throw is being made.

Throwing
the Discus

The method of making the throw is by a full-arm sweep.

**Technique in
Throwing**

The discus is gripped by hooking the fingers and thumb over the edge, keeping them well spread and holding the palm of the hand down. It may be thrown with or without a turn of the body, but since the turn gives greater distance it is generally used. The contestant stands with his back in the direction of the throw and starts by bringing the arm down and far back to the right, so that the full sweep to the left and over the shoulder will make an arc of about three-quarters of a circle. As the arm comes round to the left the body turns with a leap, alighting with face in the same direction as before, the arm following around and the discus being released as the arm comes up to the left shoulder. Getting speed into the swing and turn is very important, for since the weight is light strength does not count quite so much. From the health standpoint it is well to practice throwing with both the left and right hands, in order to use equally the muscles on both sides of the body.

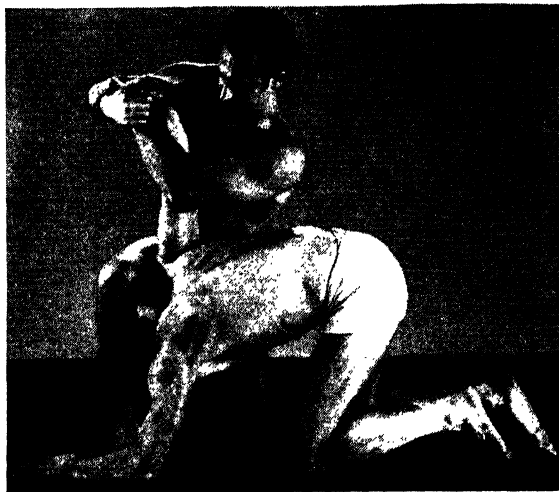
Throwing the Javelin.—This form of athletics is no doubt a relic of the times when the throwing of spears was an important form of offense in war. The present javelins, however, are very light, weighing only about two pounds. They are made of wood with a metal point and are about $8\frac{1}{2}$ feet long. About the center of the shaft there is a binding of whipcord about 6 inches wide which serves as the grip from which the javelin is thrown. No other grip is allowed.

**Throwing the
Javelin**

The javelin is thrown from a scratch-line instead of a circle. This consists of a board 3 inches wide and 12 feet long sunk flush with the ground. A balk-line is drawn 15 feet in front of this. Stepping over the line counts as a balk and two balks as a trial. Each contestant is allowed three trials, his best throw being counted. The javelin is cast somewhat like putting the shot, using a good body-bend, but momentum is gained by running instead of by turning the body. It will be seen that skill counts heavily here, and one should aim to develop good form before trying for distance.

WRESTLING.—This exercise provides a remarkable method of body-building. It stands in fact in the forefront of all athletic pursuits as a means of general development, and it is not surprising to find wrestlers continuing their activities longer than other specialists in athletics.

The efforts involved in wrestling are extremely strenuous. Yet it may be said no less truly that the extent of the wrestler's exertions is determined by the degree in which his opponent proves inferior or superior to him in strength and



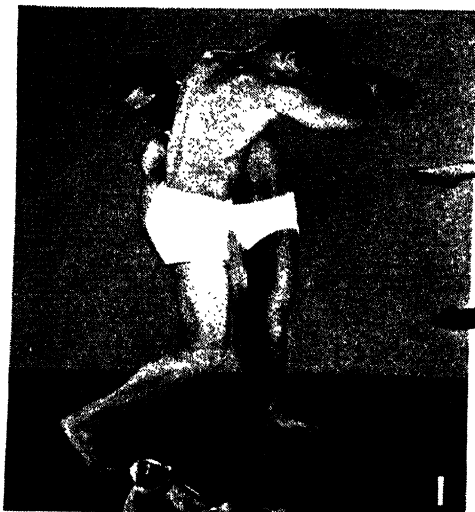
Upper man uses both hands in combination with leg to force opponent down to a fall.

ability. In other words, when opponents are equally or approximately matched, it insures a maximum of exercise with what is really a minimum of risk. Even girls, in the proper kind of costume, can engage in wrestling with safety, if they are fairly matched with their opponents. For frailty or physical timidity are not insuperable obstacles to the beginner in wrestling.

Specialization in sports is condemned by authorities on physical training, because the development of any special parts of the body at the expense of others is, unquestionably, not desirable. Wrestling develops the muscular system throughout the entire body when practiced in a proper manner. Through the twisting motions constantly being made, it strengthens the spinal column and increases its flexibility; and because of the rapidity with which various holds have to be taken and broken and the necessity for maintaining holds and balance, it develops an unusual degree of agility and mental alertness. It acts as a tonic to the nerve-centers and the brain, and inspires a feeling of self-confidence that is a great asset in any walk of life.

Although a sport that is extremely strenuous, wrestling does not involve the constant activity demanded by some other sports, and experienced men can go through an entire bout with but little increase in pulse-rate and little inconvenience in

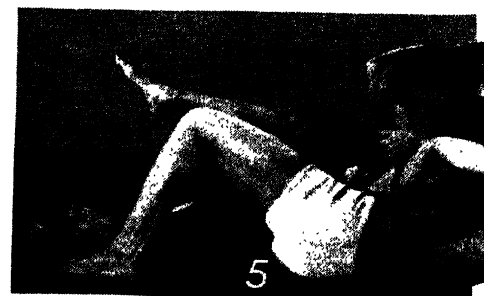
Wrestling: A
Body-
Builder



1. Trying for a crotch-hold while opponent in foreground attacks with arm-hold.

2. Man in background attempts to secure fall by half-Nelson hold combined with crotch-hold.

3. A sudden attack with attempt to obtain crotch-hold on opponent in combination with wrist-hold.



4. Man in background attempts to throw opponent off feet by forcing his knee against opponent's leg while lifting him from the ground with waist-hold.

5. Man beneath is threatened with fall from arm-lock gained by upper man.

6. Bridging to avoid fall from crotch-hold combined with Nelson.



BALANCE AND LEVERAGE IN WRESTLING

breathing. The combatants are not tense and straining throughout an entire bout. A good wrestler knows just when he can relax without losing his advantage or allowing his opponent to gain any advantage over him, so that during a bout there are always alternating periods of tension and relaxation of the large muscles of the body, which are the ones principally used, although every muscle is brought into play to a greater or less extent. It is these intervals of relaxation which enable the combatants to continue a bout without too much strain or exhaustion.

Neither is wrestling a matter of mere strength. Many a match has been signally won by the lighter and less rugged wrestler. To insure such a result the lighter man must be possessed of cleverness, ability, a good head and the knowledge of when and how to relax, and must be better versed in the tricks of the game than his opponent. Wrestling is not a haphazard struggle, it is a science; and to be a successful wrestler one must have great persistency and determination, never giving in an inch, never letting one's opponent know what strain one is under, never allowing him to sense that one is weakening or fears defeat, for many a match has been won by working out of an apparently unconquerable hold, and the tables may be turned in a trice, to the advantage of the apparent loser.

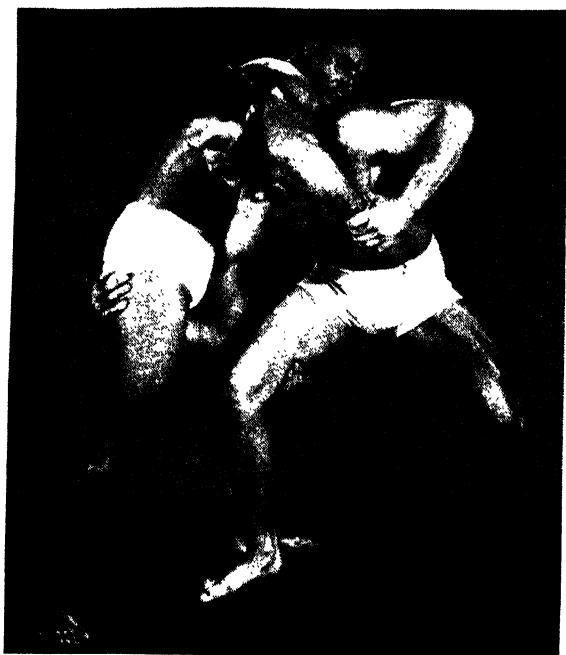
Strength vs
Skill in
Wrestling

Before going into the sport seriously, a physical examination by a competent person is advisable, and a greater or less degree of general exercise should precede actual work on the mat. As the sport involves the entire body, preliminary training also must be general.

The use of two hands in strangle-holds is barred in both professional and amateur wrestling, although one hand or arm may press the opponent's throat, provided his hold is not held by the other hand or arm of the aggressor. In amateur wrestling the hammer-lock and toe-hold also are barred.

Wrestling.—Equipment.

The Ring.—In both amateur and professional wrestling the ring is of the same size as for boxing, namely 16 to 24 feet square. A mat of padded canvas approximately 2 inches thick is necessary to prevent injury from violent contact with the floor or ground.



Man in foreground combines crotch-hold with arm-hold to bring his opponent at the left and back down to mat.

Wrestling Costume

the knees from sudden dropping to the mat. These are worn in front of the knee-cap and are held in place by being fastened above and below the knee. A supporter should be worn to protect the genital organs; but it is not a good thing to wear a metal cup, as is sometimes done by boxers, for if pressure is made against it during a bout, it may cut into the flesh.

Costume.—For Catch-as-Catch-Can and Greco-Roman wrestling the costume consists of a pair of light trunks, similar to those used by boxers, and a pair of rubber-soled or other shoes of light material. Socks may be worn if desired. Knee-pads composed of some soft material well padded, are sometimes worn to prevent injury to

GYMNASIUM AND CLASS WORK

Section 6

THE term *Class Drill* is applied to a group or series of exercises, with or without such apparatus as dumbbells and wands, performed in unison by a number of persons directed by a leader. The exercises may include various kinds, such as facing, marching, running, calisthenics, exercises with apparatus, etc., or they may be limited to one kind. Usually, more than one kind of exercise is used, and the movements are carefully arranged in a definite order so as to meet the physiological requirements of the pupils. The instructor describes and illustrates the exercises and then leads the class by command, or by both command and performance of the exercises. The movements may be performed by each pupil individually, or by two joining together to make a single exercise; but whether acting individually or in pairs the whole class works in unison. Movements done in pairs are more complicated and are generally used for advanced students only.

Kinds of
Class Drills

Class drills have several advantages over exercises taken alone. They have also one disadvantage, namely, that all the pupils take the same exercises at the same speed without regard to individual capabilities, needs or peculiarities. However, these factors are not so important when dealing with normal persons, and those who take regular gymnasium work are supposed to be at least approximately normal. The Y.M.C.A.'s and similar institutions require a medical examination before members are accepted. Under these conditions, class work, while not necessary for results, is to be preferred for the following reasons.

First, it is more interesting to exercise with others than alone. Many persons start exercising with good intentions, but soon lose interest and stop. In a class there is a greater tendency to continue because of the pleasant associations. Second, class work is disciplinary. The classes are held at regular hours and the exercises are taken in a regular order.

The pupils are required to adhere to certain rules of conduct and to keep the gymnasium neat. All this instils a sense of order and regularity which helps to perpetuate the habit of exercise. Third, class work gives the pupils an opportunity to compare their work with that of others and thereby discover both their own weak points and strong points. Their own observations and the suggestions of others will help greatly in improving their technique. Fourth, the class drills are arranged by experts to meet the requirements for proper physical education and are not a haphazard collection of exercises gleaned from various sources, as is likely to be the case when a convert starts exercising by himself. Finally, there is the advantage of leadership, of having someone who knows how to guide and direct and inspire one in the effort to build a perfect body.

Leadership
and
Class Drills

THE CLASS LEADER'S REQUIREMENTS.—Many pupils will be interested in becoming leaders, and all pupils should try leading occasionally for practice and self-confidence. The first requirement for a good leader is that he be interested in his work. It should be play to him, so that the enthusiasm he has for it will be communicated to his pupils and serve as an inspiration. Interest in his work will also give the leader patience and tact in dealing with the shortcomings of his pupils, and he will be continually trying to improve them for the credit they will be to the work. The leader should be thoroughly prepared by both training and experience. Experience is the great teacher and may be sufficient to make a good leader; but some special training in teaching and a knowledge of associated subjects, such as anatomy, physiology, first-aid, etc., will make him a better one. There are schools which make a specialty of training instructors of physical education, and if one aspires to lead gymnasium classes it is well to take such a course, not only for the knowledge gained but because of the prestige it gives. Of course, if one does not expect to make a business of physical education this is not so necessary. However, such a course is very valuable if only for the health benefit. Finally, a good personality is a very valuable asset to an instructor, because it will call forth the loyalty, interest and enthusiasm of the pupils. The leader should be a leader in every sense of the word, and while one may not have been born with a marked

talent for leadership, much may be gained by sincere effort and practice. Mere practice in giving commands will be found a great help.

The duties of an instructor are varied. He must not only plan the drills and conduct them, but he must see that the gymnasium is kept in order, he must look after special needs of individual pupils, he must constantly instil enthusiasm into his charges, and he must always see that he himself is an example and an inspiration. In planning the drills he should include sufficient variety to avoid monotony, though never losing sight of the necessity for a balanced regimen and of meeting the particular needs of the pupils. It is well to make some little change in a drill every day, unless a particular drill is being practiced for exhibition, in which case the striving for perfection of form will supply the element of interest. It is not necessary to entirely reconstruct a drill every day—in fact, this would be impossible—but different exercises may be used in the same groups so as to give a little change. Thus the pupils will be kept on the alert by not knowing just what is coming.

**The Class
Instructor
as a Leader**

Apparatus Work and Gymnastics also come within the province of the physical instructor, and the class-drill is the customary means of teaching this form of gymnastic work. After class-work in free-hand and floor calisthenics, the class as a whole, or a number of squads under assistant class leaders, may engage in apparatus work. With a class of experienced scholars, the entire drill may be made up of apparatus work. In Section 4 of this volume, page 1131, and following pages, apparatus work and gymnastics are discussed, and the fundamental and technical details involved are illustrated and described.

In the present section, the following pages deal chiefly with the work of the class leader in free-hand and floor calisthenics, and with other drills in which no apparatus is used.

There are certain courtesies which the class owes to the instructor, as well as obligations which the instructor owes to the class. The pupils should pay attention to what is being done, should give prompt obedience to commands, and should accept gracefully and cheerfully all criticisms or defeats. Regularity and prompt attendance are also important duties.



FREE-HAND CALISTHENICS: Series I. (For description see pages 1415 and 1417.)

FREE-HAND CALISTHENICS: SERIES I

Position at attention: body erect; chest high; chin in; hands at sides.

1. Exercises for the biceps and triceps, or arm muscles.

- a. Bend the elbows; bringing the closed fists close to the shoulders. Strike forward with the left fist, *one!* strike forward with the right in the same way while bringing the left back to the first position, *two!* Repeat continuously 10 to 20 times.
- b. Strike downward with the left fist, *one!* strike downward with the right while bringing the left back to first position, *two!* Repeat continuously 10 to 20 times.
- c. Strike straight upward with the left fist, *one!* strike upward with the right while bringing left back to first position, *two!* Repeat continuously 10 to 20 times.
- d. Strike out to the side with the left fist, *one!* strike to the side with the right fist while bringing the left back to first position *two!* Repeat continuously 10 to 20 times. Fully extend the arms each time.

2. For the deltoid or shoulder muscles.

- a. Hold arms close to the sides, keeping them fully extended downward, including hands and fingers. Raise arms upward with a snap to position illustrated, keeping elbows rigid, *one!* return to first position, *two!* Repeat from 10 to 20 times.
- b. Raise arms forward to level with the shoulders, *one!* lower them to first position, *two!* Repeat 10 to 20 times.
- c. Raise arms backward and upward as far as possible, *one!* lower them to first position, *two!* Repeat 10 to 20 times.

3. For the pectoral or chest muscles.

Hold the arms as illustrated in 2. Keeping the elbows rigid, cross arms in front of chest as illustrated, *one!* return to first position, *two!* In repeating this exercise from 10 to 20 times, alternate the position of the arms in crossing, first left over right, then right over left. Vary by crossing arms as low in front of the abdomen as possible; horizontally in front of the chest; and in front of the throat.

4. For the latissimus dorsi muscles of the back.

Hold the arms extended forward, shoulders high, elbows rigid. Swing arms backward and cross behind the back, being careful to hold the elbows stiff, *one!* return arms to first position, *two!* Repeat 10 to 20 times, alternating the position of the arms at each crossing. Vary by beginning with position 2.

5. For the arm and shoulder muscles.

Position at attention. Rotate the arms inward as far as possible at the same time bringing the shoulders forward so that the backs of the hands nearly touch, *one!* rotate the arms outward as far as possible, at the same time bringing the shoulders backward, *two!* Repeat 10 to 20 times.



Free-Hand
Calisthenics
Series I
Easy
Movements
For Those
Just
Beginning
Exercise
(For description see
page 1417.)



FREE-HAND CALISTHENICS: SERIES I (*Continued*)

6. For the muscles of the sides and lower back.
Place hands on hips, fingers forward, thumbs back (hips firm position). Bend body as far as possible to the left, keeping the hips firm and knees straight, *one!* return to erect position, *two!* bend body to the right, *three!* return to position, *four!* Alternate 10 to 20 times.
7. For the back and abdominal muscles.
Hips firm as in 6. Bend body back as far as possible, *one!* return to erect position, *two!* bend body forward as far as possible, *three!* return to erect position, *four!* Repeat from 10 to 20 times. In case of weak abdominal muscles, hernia, prolapsed organs or recent operation avoid the backward bending or clasp the hands over the abdomen and bend only slightly backward.
8. For the oblique abdominal muscles.
Hips firm as before. Rotate the body to the left as far as possible, keeping the hips as free from motion as possible, *one!* return to first position, *two!* rotate the body to the right, *three!* return to first position, *four!* Repeat 10 to 20 times.
9. For the upper thigh and deep abdominal muscles.
Hips firm. Raise the flexed left knee forward as high as possible, pointing the toe downward, *one!* return to position, *two!* repeat the same movement with the right leg, *three* and *four!*
10. For hips and outside thigh muscles.
Hips firm. Raise left leg sideward outward, keeping knee rigid and pointing the toe, *one!* lower the left leg, *two!* repeat movement with the right leg, *three* and *four!* Alternate 10 to 20 times.
11. For hips and inside thigh muscles.
Hips firm. Keeping knee rigid and pointing the toe, cross the right leg over right as far as possible, as illustrated, *one!* return leg to first position, *two!* repeat movement with the left leg, *three* and *four!*
12. For hips and back thigh muscles.
Hips firm. Keeping knee rigid and pointing the toe, raise the left leg backward and upward as far as possible, *one!* return leg to first position, *two!* repeat the same movement with the right leg, *three* and *four!*
13. For hips and front thigh muscles.
Hips firm. Keeping knee rigid and pointing the toe, raise the left leg forward and upward, *one!* return leg to first position, *two!* repeat movement with the right leg, *three* and *four!* Alternate 10 to 20 times.
14. For all the forward thigh muscles.
Hips firm. Do the full knee bend, assuming the squatting position illustrated, *one!* return to first position, *two!* Repeat from 5 to 10 times. Be careful to keep the back erect and chest up.
15. For the leg (calf) muscles.
Hips firm. Raise heels as high as possible, *one!* return to first position, *two!* Repeat 10 to 20 times.



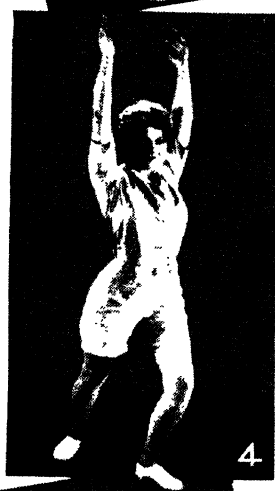
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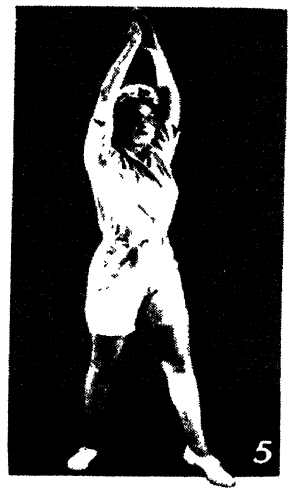
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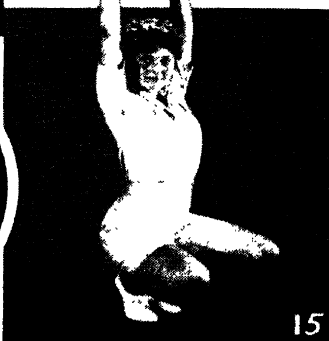
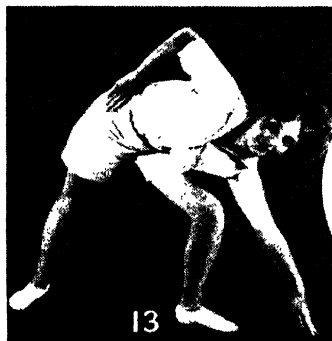
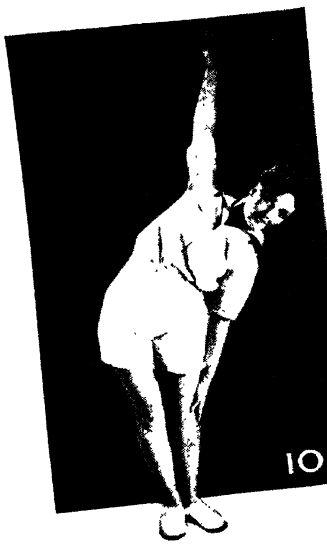
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FREE-HAND CALISTHENICS: Series II. (For description see next page.)
1418

FREE-HAND CALISTHENICS: SERIES II

Combination Movements. Position at attention; body erect; chest high; chin in; arms at sides.

1. For shoulder muscles. Assume position shown in the illustration with left arm stretched well up and right extended backward, elbows rigid. Swing the left arm down and backward and the right arm forward and up, *one!* Return to first position, *two!* Repeat continuously 10 to 20 times.
2. For neck and upper thigh muscles. Place hands on hips. While raising left knee as illustrated, bend the head back as far as possible, *one!* Return to first position, *two!* Perform the same movements with the right leg, *three* and *four!* Alternate 10 to 20 times.
3. For shoulder, back and abdominal muscles. Holding the elbows rigid, stretch the arms high over the head. Swinging the arms, bend body forward, downward, back and up as far as possible, *one!* Return to first position, *two!* Repeat 5 to 20 times.
4. For shoulder and leg muscles. Lunge forward with the left leg, bending the knee as illustrated, and swing the arms forward and upward over the head, *one!* Return to first position, *two!* Perform same movements lunging with the right leg, *three* and *four!* Alternate 10 to 20 times.
5. For shoulder and hip muscles. Touch toe on floor forward left and swing the arms side upward over head, keeping the elbows rigid, and clasping the palms together, *one!* Return to first position, *two!* Perform the same movements with the arms but touch toe forward right, *three* and *four!* Alternate 10 to 20 times. This same exercise may be performed by touching the toe sideward left and right.
6. For the arm, shoulder, hip and side trunk. Flex arms at side, bringing the clenched fists up in front of the shoulders. Strike straight out with the left fist while stepping forward on the left foot, *one!* Return to first position, *two!* Strike out with the right fist and step forward with the right foot, *three!* Return to position, *four!* Alternate 10 to 20 times. Do this exercise with snap and vigor.
7. For shoulder and leg muscles. Raise the shoulders and the heels as high as possible, *one!* Return to position, *two!* Repeat 10 to 20 times.
8. For arm, shoulder, hip and thigh muscles. Flex arms at sides, bringing the clenched fists up in front of the shoulders. Strike straight upward with the left arm, while raising the left knee as illustrated, *one!* Return to first position, *two!* Repeat the movements with the right arm and leg, *three* and *four!* Alternate 10 to 20 times.
9. For the arm, shoulder and waist muscles. Raise arms side upward, bending at the elbows and touching the finger tips on the shoulders as illustrated, *one!* Rotate the body to the left as far as possible, keeping the hips firm, *two!* Return to front position, *three!* Lower the arms to first position, *four!* Repeat, rotating the body to the right. Alternate 10 to 20 times.



Free-hand calisthenics.
Combination movements,
affecting all the larger
groups of muscles.



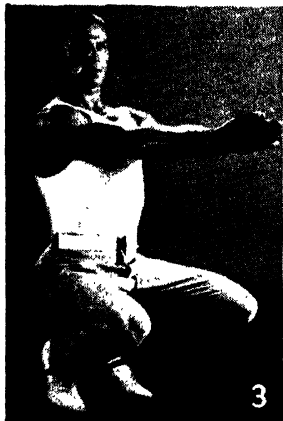
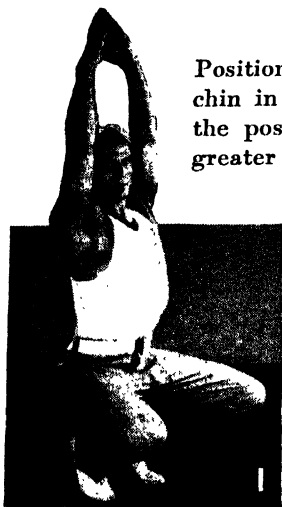
Series II is a more
advanced set of move-
ments than Series I, re-
quiring greater exertion
and muscular coordina-
tion. (See next page for
description.)

FREE-HAND CALISTHENICS: SERIES II (*Continued*)

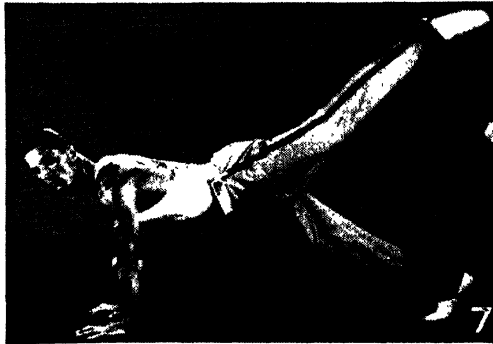
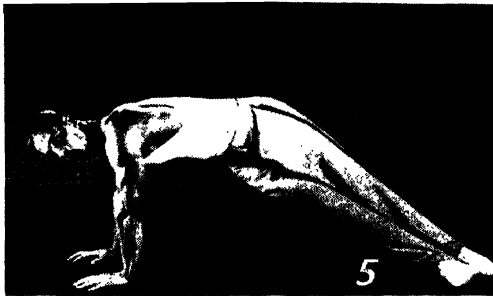
10. For shoulder and side trunk muscles. Bend the body to the left while raising the right arm side upward overhead and stretching the left hand downward along the left leg, *one!* Return to position, *two!* Bend right and raise left arm, *three!* Back to position, *four!* Alternate 10 to 20 times.
11. For leg, hip and abdominal muscles. Place hands on hips. Stride well forward with the left leg, bending the knee, *one!* Keep the right knee stiff and bring the weight of the body well over the forward leg. Step back to first position, *two!* Perform the same movement with the right leg, *three* and *four!* Alternate 10 to 20 times.
12. For the shoulder, back and abdominal muscles. Place hands on shoulders as in 9. Bend the body obliquely forward, extending the left arm to touch the left foot with the fingers, while stretching the other arm high above the head, *one!* The knees must not be bent. Return to first position, *two!* Touch right hand to right foot, *three!* Return to position, *four!* Alternate 10 to 20 times.
13. For all the larger groups of muscles. Place hands on hips. Stride forward with the left leg, bending the knee; at the same time lean forward and touch the left hand to the floor as far as possible in front of the foot, *one!* Return to first position, *two!* Stride forward with the right leg and touch right hand to floor, *three!* Return to position, *four!* Alternate 10 to 20 times.
14. For the shoulder, abdominal and back muscles. Raise arms high over head, fingers extended, elbows rigid. Bend forward and touch the toes with the finger tips without bending the knees, *one!* Return to erect position, *two!* Bend backward as far as possible, *three!* Return to erect position, *four!* Repeat 10 to 20 times.
15. For arm, shoulder and leg muscles. Flex arms at sides, bring the clenched fists in front of the shoulders. Do the full knee bend, dropping into the squatting position illustrated, and at the same time strike upward with the fists, *one!* Return to first position, *two!* Repeat 5 to 20 times.
16. A general body exercise, which is also excellent for the feet. Extend left leg forward and left arm upward. Reverse the position of the arms and legs by hopping from one foot to the other. Alternate continuously, counting *one* and *two!* Be sure to keep the arms straight.

FLOOR CALISTHENICS

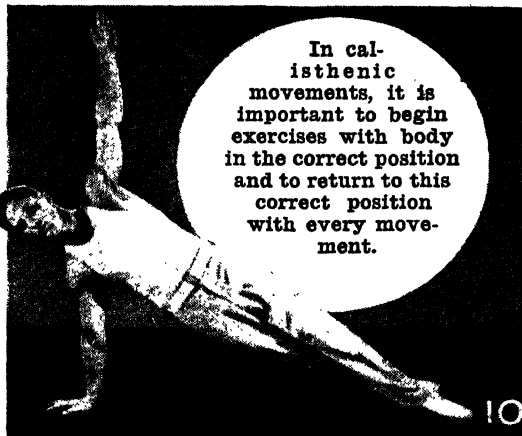
Position at attention: body erect; chest high; eyes front; chin in; arms at side. Fairly vigorous exercise, in which the position of the body offers further resistance so that greater exertion is required and hence greater development is attained.



1. For leg and thigh, arm and shoulder muscles. Place hands on hips, *one!* Raise arms forward and upward over head, bringing palms together, *two!* Return hands to hips, *three!* Stand up, *four!*
2. For the back muscles from heels to head. Assume sitting position with legs straight, leaning somewhat backward and supporting the body on the extended arms. With knees and elbows rigid raise the hips as high as possible, *one!* Return to sitting position, *two!* Repeat 5 to 10 times.
3. For the leg and the shoulder girdle muscles. Assume squatting position and extend the arms forward shoulder high, palms together, elbows rigid. Swing arms vigorously outward and backward, clapping the palms together, *one!* Swing arms forward, again clapping palms, *two!*
4. For the hip and abdominal muscles. Assume position shown in the illustration with arms straight but body bent so that the hips almost touch the floor. Keeping knees and elbows rigid, raise the hips as high as possible, *one!* Return to first position, *two!* Repeat 5 to 10 times.

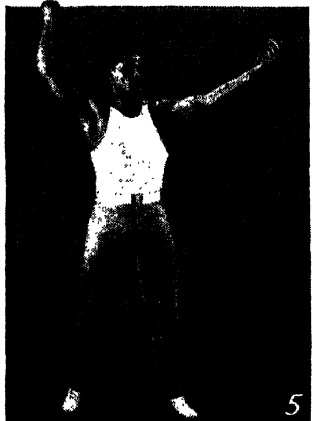
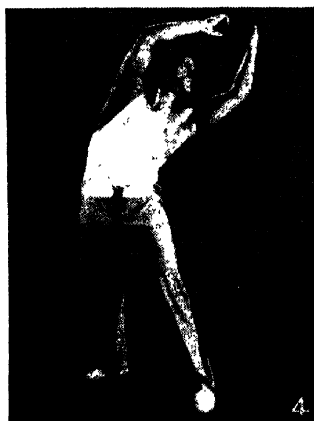
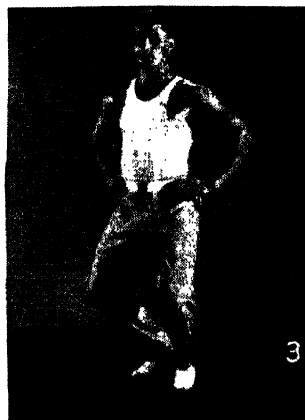
FLOOR CALISTHENICS (*continued*)

5. For all the larger groups of muscles but especially the hips and abdominal muscles. Assume squatting position oblique with hands on the floor between the knees. Jump backward and to the left with the legs so that the body rests on the palms and the outside of the right foot, *one!* Keep the hips up. Lower the hips almost to the floor, *two!* Raise the hips, *three!* Return to squatting position, *four!* Repeat, jumping backward and to the right with the legs, 4 to 8 times.
6. For hip and leg muscles. Place hands on hips, lunge obliquely forward and to the right with the right leg, bending the right knee while holding the left knee stiff, *one!* Return to first position, *two!* Lunge obliquely to the left, *three!* Return to first position, *four!* Alternate 4 to 10 times. When this becomes easy, vary the exercise by bending the forward knee to such an extent that one practically sits on the heel.
7. For the gluteal muscles of the hips. Assume front leaning rest position with body rigidly supported on palms and toes. Raise left leg as high as possible, *one!* Lower, *two!* Raise right leg, *three!* Lower, *four!* Alternate 4 to 10 times.
8. For hip and abdominal muscles. Position as in preceding exercise. Extend left leg outward so as to touch the toe to the floor, well out to the left, *one!* Return to position, *two!* Extend right leg outward in the same manner, *three!* Return, *four!* Alternate 4 to 10 times.



FLOOR CALISTHENICS (*continued*)

9. For the calves and thighs. Assume squatting position with fists closed and arms flexed. Briskly rise to standing position, *one!* Return to sitting position, *two!* Repeat 5 to 10 times.
10. For the muscles of the sides and upper arms. From position shown, bend waist until hip touches floor, *one!* Bring hips back to original position, *two!* Repeat 5 to 10 times.
11. For the muscles of the chest and back. From position shown, bend the back until front of hips touch floor, keeping arms rigid, *one!* Return to original position, *two!* Repeat 5 to 10 times.
12. For the arms and chest. From position illustrated, push up to position shown in 11, *one!* Return to original position, *two!* Repeat from 5 to 10 times.



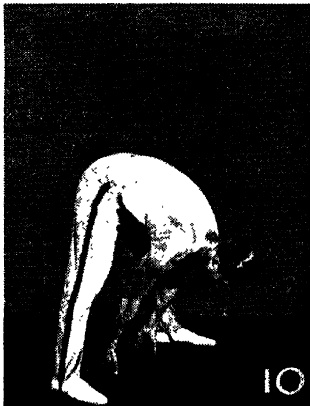
ATHLETIC CALISTHENICS

Position at attention: body erect; eyes front; chest high; arms at sides.

1. *Putting the Shot.* Assume the position shown in the illustration, holding an imaginary shot in the right hand. Now put the shot forward by extending the right arm vigorously, while lowering the outstretched left arm and bending the body forward. Alternate by throwing with the left hand and balancing on the right foot. Repeat 5 to 15 times. A more general exercise may be secured by lunging forward with rear foot when putting the shot.
2. *Bowling.* Take the position shown in the illustration, with the bowling hand extended well backward. Now bring this hand forward parallel with the body with a gliding movement, shifting the weight to the forward leg and letting go of the imaginary ball as the arm passes the forward foot. Reverse by bowling with the other hand. Repeat.
3. *High Jumping.* Place hands on hips. Bend the knees and jump straight up yet slightly forward as if over an obstacle. The height jumped should be gradually increased. Repeat 5 to 15 times.

ATHLETIC CALISTHENICS (*Continued*)

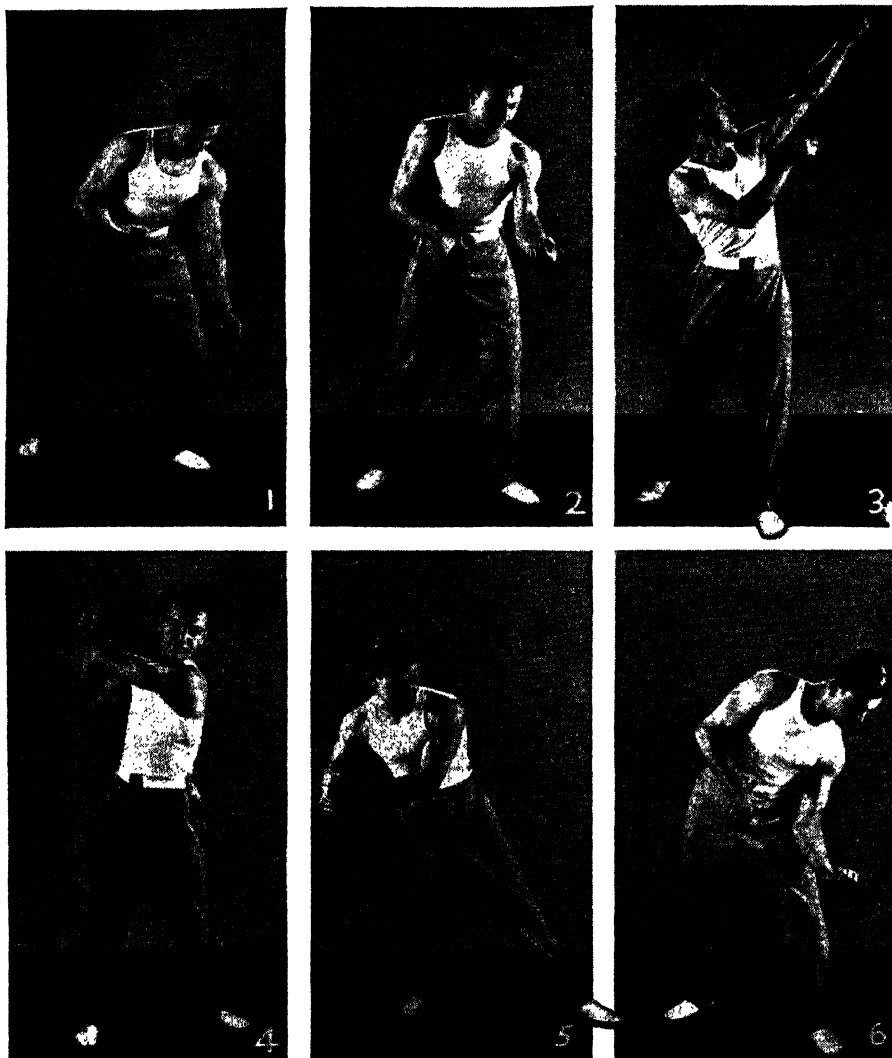
4. *Throwing the Hammer.* Clasp the hands with the fingers interlocked at the right side. Now raise them upward to the left as here shown, and swing them down to the right again in a complete diagonal circle, as if holding and swinging the hammer. Make several circles around the body and over the head, finally throwing the hammer over the left shoulder by unlocking the hands at the moment of the throw and giving an extra impetus to the imaginary hammer. Reverse the movement. Repeat 5 to 20 times. In the actual hammer throw the whole body is turned but this is not so necessary for the purposes of this exercise.
5. *Tennis (Serving).* Hold the arms as illustrated, with an imaginary racket in the right hand and a tennis ball in the left. Raise the left arm as though tossing the ball into the air, and then strike at it with a full vigorous sweep of the right arm as though serving a fast ball just over the net. Keep the legs spread and shift the weight from the rear to the forward foot when striking the ball. Practice serving the ball also with the left hand. Repeat 5 to 20 times.
6. *Broad Jumping.* Assume position shown in the illustration, with knees well bent, body forward and arms extended backward. Jump a few feet forward, bringing the arms forward vigorously at the same time. Gradually increase the distance. This exercise may be varied by jumping backwards. Repeat 5 to 20 times.
7. *Ball Throwing.* Here is illustrated the usual overhand throw. The body slopes backward at the beginning of the throw and forward at the end. Make the movement snappy and vigorous. The ball may also be thrown underhand, as in bowling. Practice with both hands from 5 to 20 times. (See next page for illustration.)
8. *Golfing (Drive).* Stand with feet apart, holding an imaginary golf club so its head rests on the ground. With eyes fixed on an imaginary golf ball, the club is swung up over the right shoulder as illustrated, with the body turned in that direction to give greater force to the blow. The club is then swung to strike the ball, and the force behind the blow is such that it swings the club up over the opposite shoulder and the body to the left without moving the feet, except raising on the ball of the foot on the side from which the blow was aimed. Reverse the stroke. Repeat 5 to 20 times. (See next page for illustration.)
9. *Swimming.* The breast stroke is practiced by bringing the bent elbows well in to the sides and holding the fingers close together, palms of the hands down. Then while shooting the finger tips straight forward, palms outward, as in the illustration, the body is inclined almost at right angles with the legs; a great sweeping outward circular motion is made with the arms, during which the body gradually assumes the erect position, to bend forward again when the elbows reach the sides. Repeat 5 to 20 times. (See next page for illustration.)



ATHLETIC CALISTHENICS (*Continued*)

10. *Football.* Stand with feet well spread, holding an imaginary football on the ground between them. From this position the ball may be shot backward between the legs, or brought up in front of the body and thrown as far back as possible over the head. Repeat 5 to 20 times.
11. *Boxing.* Stand with the body well poised, the left foot forward, arms bent and fists clenched at the sides ready to strike an imaginary opponent. The left fist is shot forward with all the force possible, and the body guarded with the right. To add force, the body is swung with each blow. Alternate by striking with the right fist with the feet in the same position and also by reversing the position of the feet.
12. *Running and Hopping.* Run in place, using an imaginary skipping rope and swinging it vigorously with the arms. Then skip on one foot several times; then change and hop on the other. Repeat the same motions without swinging the imaginary rope. Then give single hops first on one foot then on the other.

1428 FARMWORK CALISTHENICS



FARMWORK CALISTHENICS

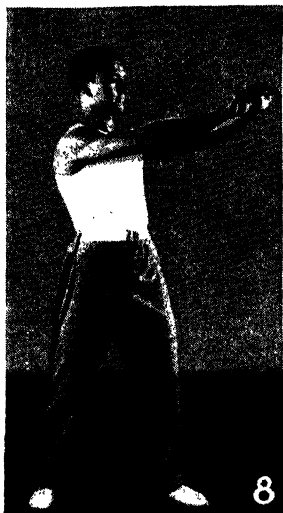
Position at attention: body erect, chest high; abdomen relaxed; eyes front; hands at sides.

1. *Using a Rake.* Grasp an imaginary rake with the left hand in front of the right; left leg extended forward. The rake is stretched as far forward as possible by extending the arms and bending the body as in the illustration. Now draw the rake back towards the body by flexing arms and bending the body back on the hips as far as it will go, throwing the weight on the back leg. Repeat 5 to 20 times. Reverse. (For descriptions of other illustrations see next page.)

FARMWORK CALISTHENICS (*Continued*)

2. *Hoeing.* Grasp an imaginary hoe in the same way as the rake in the preceding illustration, left foot forward. Bend the body slightly at the waist. Now raise the hoe a few feet from the earth, and bring it down sharply. Repeat the movement 10 to 20 times. Reverse.
3. *Hay Pitching.* Grasp an imaginary pitchfork loaded with hay. With left foot forward and body bent, lift the fork and by straightening the body, extending the arms and rising on the toes, pitch the imaginary hay high upwards and backwards over the left shoulder. Reverse.
4. *Wood Chopping.* Grasp an imaginary axe by clenching the fists and resting the side of one on the other (or interlock the fingers). Now with legs spread and right foot slightly forward, swing the axe upward and backward over the right shoulder, while swaying the body to the right, balancing on the right foot. Now bring the axe forcibly forward and down on an imaginary log. Reverse. Repeat 5 to 20 times.
5. *Cross-Cut Sawing.* Grasp one end of an imaginary cross-cut saw by resting the left closed hand on top of the right, as illustrated, left foot forward. Now extend the arms and bend the body as if the saw were pulled forward by a sawyer on the other end; then pull the saw backward, flexing the arms and bringing the body well back also.
6. *Turning the Soil.* Grasp an imaginary garden fork or spade. Stick it in the soil, pressing it deep with the left foot. Now lift it a foot or so over the ground, and turn it sharply and forcibly over by a twist of the wrists and curl of the arms.
7. *Swinging the Maul.* With feet spread apart, grasp an imaginary maul or sledge hammer. Bring it high upward and back over the right shoulder, allowing the body to swing back and around with it. Bring it forcibly forward and down on an imaginary wedge or spike, bending the body downward with the stroke. (See illustration next page.)
8. *Horse Currying.* Hold an imaginary brush in the right hand and an imaginary currycomb in the left. Now hold the arms as in the illustration and move the currycomb downwards as if currying the side of a horse. Follow this by brushing the same place with the brush, bringing down the brush as the comb hand goes upward to repeat the operation. (See illustration on next page.)
9. *Buck Sawing.* Put the left knee on a chair or on an imaginary log, or place one foot on the other knee. Hold the imaginary saw as in the illustration, and move it up and down as far as possible from 5 to 20 times, extending and flexing arms. (See illustration on next page.)
10. *Planting and Weeding.* Assume the knee-bend here illustrated, with an imaginary basket of seeds, or an empty basket over the left arm. Plant by pressing into the ground with the right hand; or weed by pulling imaginary weeds and dropping them into the basket, with the free right hand. (See illustration on next page.)

1430 FARMWORK CALISTHENICS



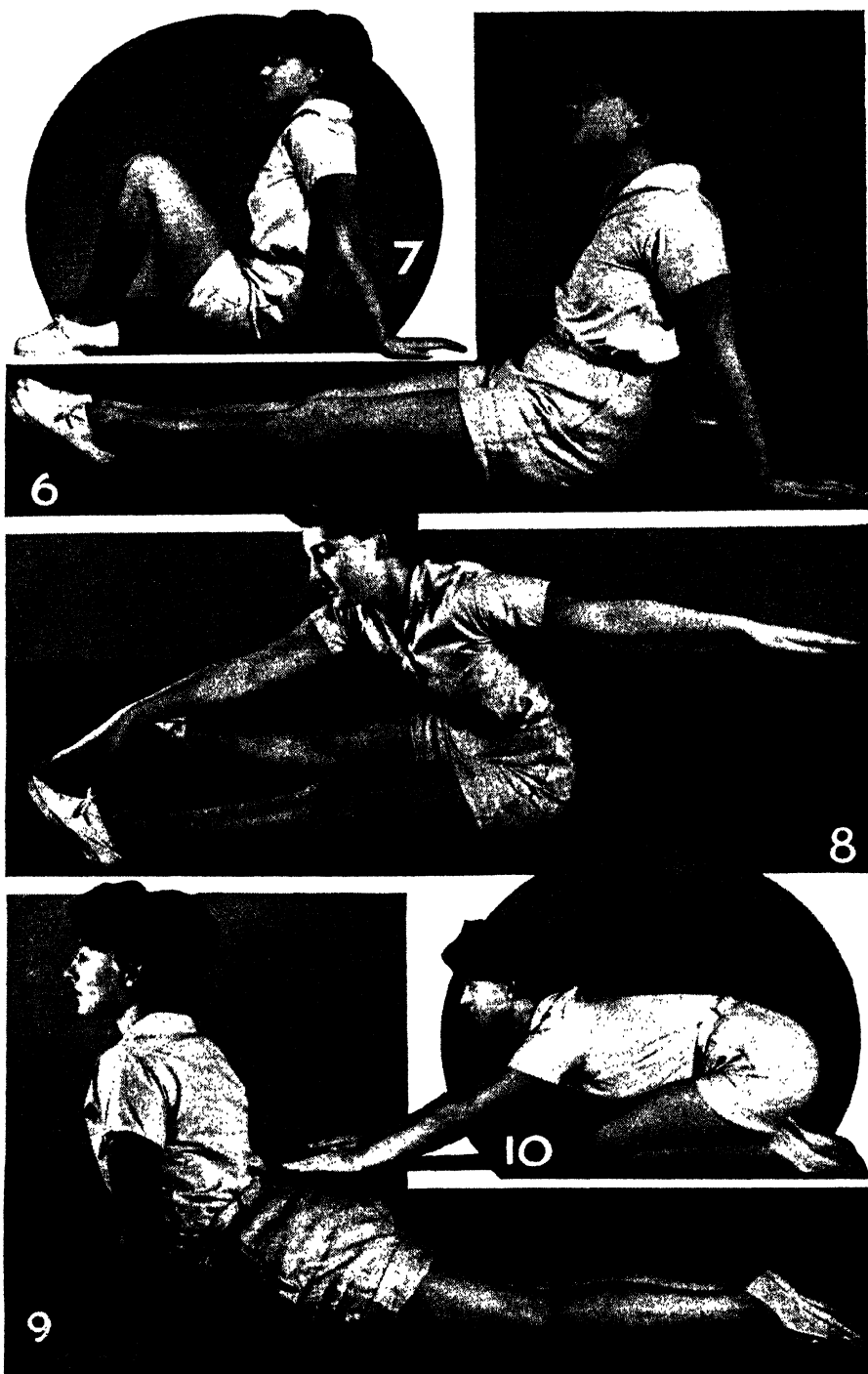
FARMWORK CALISTHENICS (Continued)

11. *Sowing Wheat.* Have imaginary wheat sack on one arm. Take the seed from this with the free hand, and scatter it by an outward sweeping circular motion from the sack to the side of the sowing hand.
12. *Scythe Swinging.* With feet apart, hold imaginary scythe outward as in the illustration, with the knuckles of the left hand perpendicular and of the right upward. Now swing the scythe with arms straight, in a forward circular motion, allowing the body to swing round with it.



COMBINATION
CALISTHENIC
MOVEMENTS

1. Take regular starting position with back erect, chin up, arms at the sides. Raise both arms side upward overhead, at the same time raising the heels, *one!* Return to starting position, *two!* Repeat 10 to 20 times. Stretch well up each time.
2. From starting position, stride forward with right leg and raise both arms forward upward overhead, *one!* Bend forward and touch the fingers to the toes without bending the knees, *two!* Return to erect position with arms overhead, *three!* And back to starting position, *four!* Repeat same exercise, striding forward with the left leg. Continue 5 to 10 times.
3. Assume standing stride position with arms extended sideward, shoulder high. Rotate and bend the body forward so as to touch the right hand to the left foot, *one!* Return to erect position, *two!* Bend and touch the left hand to the right foot, *three!* And return to first position, *four!* Keep the knees and elbows rigid. Repeat 5 to 10 times.
4. Assume standing stride position with arms extended overhead, fingers locked. Swing the arms down and back between the legs, *one!* Return to erect position, *two!* Repeat 10 to 20 times. Vary the exercise by swinging the arms outward to the side on the upward lift of the body. (Continued on second page following.)



COMBINATION CALISTHENIC MOVEMENTS. (Description of illustrations on next page.)

COMBINATION CALISTHENIC MOVEMENTS (*Continued*)

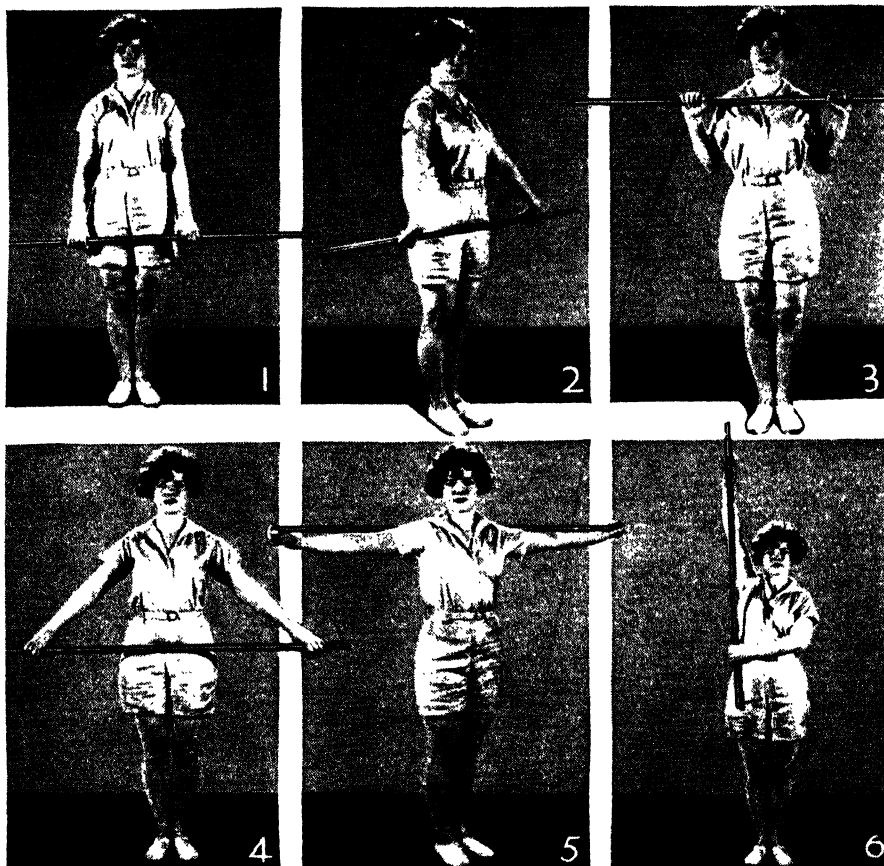
5. Assume regular starting position. Bend knees to squatting position and place the braced fingers on the floor between the knees, *one!* Jump backward with both legs to full stretch position with body supported on hands and toes, hips rigid, *two!* Return to squatting position by jumping forward with the legs, *three!* And back to erect position, *four!* Repeat 5 to 10 times.

- 6 and 7. Sit on the floor with legs extended and body supported by the braced arms as shown in 6. Draw up the knees as in 7, *one!* Extend again as in 6, *two!* Repeat 10 to 20 times. This exercise may be varied by drawing up one knee at a time, by alternating the two and by raising the straight leg instead of the bent knee.

8. Sit on the floor with legs spread and arms extended sideward shoulder high. Rotate the body and lean forward so as to touch the right hand to the left foot, *one!* Return to starting position, *two!* Touch the left hand to the right foot, *three.* Return to position, *four!* Repeat 5 to 10 times.

- 9 and 10. Assume position as shown in 9 with body supported on the straight arms and hips near or on the floor. Raise the hips and swing them backward, bending the knees, until the buttocks touch the heels as in 10, *one!* Return to first position, *two!* Repeat 10 to 20 times. Be sure to keep the arms straight.

WAND DRILL



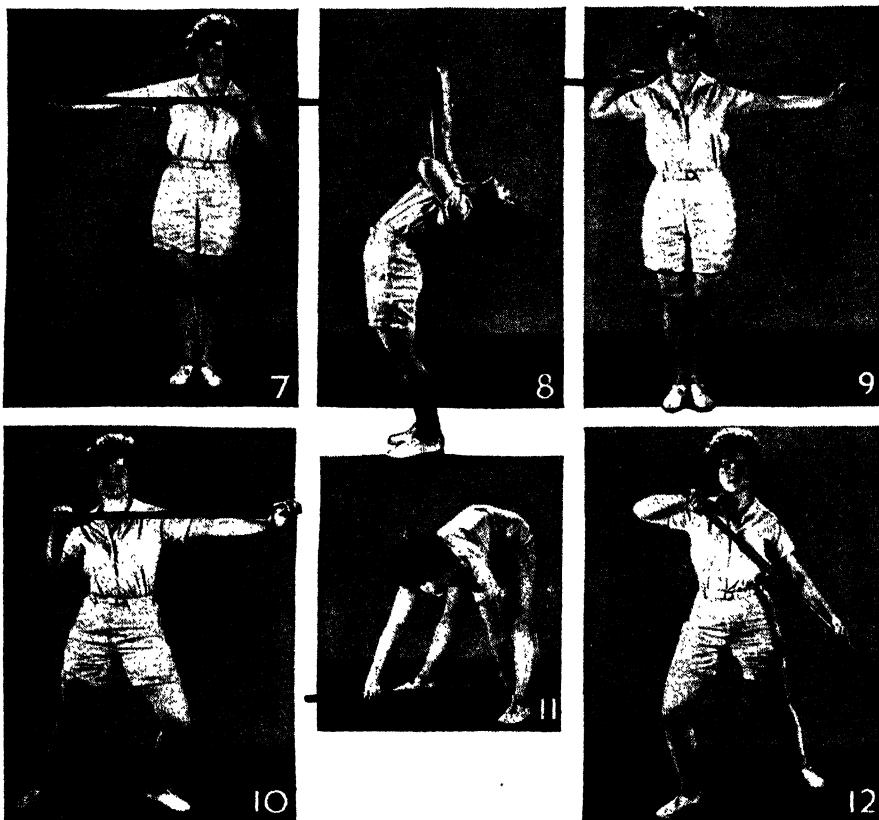
WAND DRILL

1. This illustration shows the position of attention for the Wand Drill. Head and chest are up, arms at side, grasping the wand with hands separated about the width of the body.
2. a. Slightly raise the arms so as to permit the wand free movement, then flex the wrists downward, *one!* Extend the wrists upward, *two!* Repeat 5 to 10 times.
 b. Repeat the same movements with the wand stretched arms' length in front of the shoulders.
 c. Repeat the same movements with the wand stretched arms' length above the head.
3. a. From position of attention, flex the arms as illustrated, *one!* Return to first position, *two!* Repeat 5 to 10 times.
 b. From position of attention flex arms as in illustration, *one!* Extend arms forward shoulder high, *two!* Flex again, *three!* Attention, *four!* Repeat 5 to 10 times. (Continued on next page.)

WAND DRILL (*Continued*)

- c. From position of attention, flex arms as illustrated, *one!* Extend arms high over head, *two!* Flex again, *three!* Attention, *four!* Repeat 5 to 10 times.
- d. Flex arms as in illustration, *one!* Extend arms forward shoulder high, *two!* Bend forward, bringing the wand as near the floor as possible, keeping knees rigid, *three!* Return to erect position, *four!* Flex arms again, *five!* Attention, *six!* Repeat 5 to 10 times.
- 4. a. Hold wand well out towards the ends. Bring wand up over the head and down to the small of the back, *one!* Return to first position, *two!* Repeat 5 to 10 times.
- b. From position illustrated, raise right hand over head, *one!* Lower, bringing wand down behind the back, *two!* Raise left hand over head, *three!* Lower, bringing wand to first position, *four!* Reverse these movements in four counts, beginning with the left hand.
- 5. Position as illustrated with wand across and in back of shoulders.
- a. Bend body to the left as far as possible, *one!* Bend far to the right, *two!* Repeat continuously 8 to 16 times.
- b. Rotate body to the left, *one!* Turn body in the same manner to the right, *two!* Repeat continuously 8 to 16 times.
- c. Bend forward at the waist, keeping the head and back straight, *one!* Bend backward, *two!* Repeat continuously 8 to 16 times.
- d. Bend forward at the waist, *one!* Rotate body to the right, *two!* Return to second position, *three!* Back to starting position, *four!* Alternate by rotating body to the left. Repeat 4 to 16 times.
- e. Rotate body to the right, *one!* Bend forward, *two!* Return to erect position, *three!* Back to first position, *four!* Alternate by turning the body to the left. Repeat 4 to 16 times.
- 6. Hold wand near ends as in 4.
- a. Bring the wand to a vertical position by raising the right arm side upward overhead and bending the left at right angles, *one!* Return to first position, *two!* Raise left arm, *three!* Return to position, *four!* Alternate continuously 8 to 16 times.
- b. Bring wand to position illustrated as above described, *one!* Bend body to the left, *two!* Straighten, *three!* Back to original position, *four!* Alternate by bringing the wand to the left side and bending to the right. Repeat 4 to 16 times.
- c. Charge (step) forward with right foot, swinging wand up to position illustrated, *one!* Bend body to the left, *two!* Straighten, *three!* Return to first position, *four!* Alternate to other side.
- 7. a. From position of attention flex the arms, at the same time sliding the right hand to the end of the wand as in position illustrated, *one!* Return to first position, *two!* Alternate to the left, *three* and *four!*

WAND DRILL



WAND DRILL (Continued)

- b. From attention, assume position illustrated as above described, *one!* Rotate body to the right, *two!* Return to front position, *three!* Attention, *four!* Alternate by extending the left arm and bending the body to the left. Repeat 4 to 16 times.
- c. Same as last exercise, except that when assuming the first position, the person steps forward on the right foot, and back at the fourth count. In alternating, the left foot steps forward.
8. Grasp wand at the ends and raise right arm forward shoulder high, at the same time bringing the left hand to the right shoulder, *one!* Bend backward until the wand reaches vertical position as here shown, *two!* Return to erect position, *three!* Attention, *four!* Alternate to the other side. Repeat 4 to 16 times.
9. a. From position of attention, swing the wand up over the head to position illustrated, *one!* Return to first position, *two!* Alternate by extending the right arm. Repeat continuously 8 to 16 times.
(Continued on next page.)

WAND DRILL (*Continued*)

- b. Assume position illustrated. Lunge to the left, *one!* Bend body to the left, *two!* Straighten, *three!* Come back to position, *four!* Alternate to the right. Repeat 4 to 16 times.
 - c. With wand held as illustrated, lunge forward with the left foot, *one!* Bend forward, *two!* Straighten, *three!* Back to position, *four!* Alternate with the right foot. Repeat 4 to 16 times.
10. a. Position at attention. Flex the arms on the chest while lunging sideward to the left, *one!* Thrust the wand horizontally to the left as far as possible as illustrated, *two!* Flex the arms on the chest, *three!* Attention, *four!* Reverse the movement. Repeat 4 to 16 times.
- b. The same as the preceding, except that the arms only are flexed on the first count, the lunge and side thrust of the wand being performed simultaneously on the second count, returning on third and fourth counts.
11. Stand with feet apart, knees rigid. Move the wand horizontally to the right as far as possible, *one!* Bend forward, bringing the wand down as near to the floor as you can without bending the knees and swinging the right hand forward, the left back, *two!* Return to second position, *three!* Back to attention, *four!* Alternate by extending the wand left and swinging left hand forward. Repeat 4 to 16 times.
12. a. Stand at attention. Lunge forward right while bringing the left hand down and back and the right across in front of the left shoulder, *one!* Attention, *two!* Alternate to the other side. Repeat 4 to 16 times.
- b. Stand at attention. Lunge forward right and move the wand as in the preceding exercise, *one!* Thrust the wand obliquely forward, upward by straightening the right elbow and bringing the left hand up to the left shoulder, *two!* Return wand, *three!* Attention, *four!* Alternate to the other side. Repeat 4 to 16 times.

Types of Class Drills. The equipment of the well-trained physical instructor includes a basic understanding of the use of the horizontal bar, vaulting horse, low and high parallel bars, the rings and other advanced gymnastics. The use of such apparatus has been illustrated and described in Section 4, on page 1131 and following pages. This section deals chiefly with drills in which no heavy apparatus is used.

As the instructor always should be visible to the class, a platform or similar elevation is helpful. The instructor, as he faces the class, left side opposite the right side of his pupils, should illustrate exercises for the right arm or leg by the use of his own left arm or leg. Otherwise, pupils will confuse the use of the right and left arm and leg.

Order of
Exercises
in Class
Drills

For a class in all-round exercise it is customary to start by practicing a few turnings which will be used in marching. Then the marching at both regular and double time is given, finishing up by arranging the class in files for the regular drills. The drill may consist of simple free-hand calisthenics, or of these with the addition of some floor calisthenics or a dumb-bell or wand drill. After this there are games. In arranging the program the point to be kept in mind is that the exercise period as a whole, and also each part of it, should start and finish with light movements, the heaviest ones being placed near but not quite at the end. In arranging a calisthenic drill, for instance, exercises for the hands and neck would be placed first; then shoulder and arm movements; then body and knee bendings, which are the most strenuous; then leg movements and finally exercises for the feet. For the amateur a good plan is to start with the hands and follow the joints, as the sequence will be easy to remember and the general effect will be in accordance with the rules already given. On this plan one starts with finger movements and follows with wrist, elbow, shoulder, neck, waist, hips, knees and ankles. Then if it is desired to add some heavier exercises, combination movements employing several parts of the body at once, either in the standing, sitting or reclining positions, may be performed. A few breathing exercises should be taken at the start and finish of the drill and between each of the main parts of it. When doing strenuous exercises it may be advisable to take a few breathing exercises after every

two or three major movements. The breathing not only helps to keep the heart and lungs working smoothly and the circulation equalized, but adds variety to the drill. The games employed should not be too strenuous. A little indoor baseball or volley-ball is excellent, or some games with the medicine-ball may be employed. If the class plays very vigorously it may be well to follow the games with a few breathing exercises. After dismissal a shower and rub-down are taken.

When starting work with a new class the first thing is to instruct them as to how to "fall in." This means lining up along one side of the gymnasium and assuming the position of "attention." The line should be straight and each pupil should stand erect, with arms at the sides, head up and eyes to the front. The instructor should also assume this position. It should never be forgotten that the teacher should in all ways be an example to his pupils. He should be careful of his posture, his deportment and his general habits of living. He should keep in training, so that as far as possible he may be able always to do the exercises a little better than his pupils. It is important that the pupils be trained in all the details of the erect position, as this is the starting position, or the foundation of the starting position, for all movements. It was formerly taught that one should stand with the heels together and toes separated by an angle of 45 to 60 degrees, but it is now considered better to stand with the feet parallel, or practically so, and separated about six inches. This puts the weight on the outside of the feet where it belongs and gives one a good balance.

"Fall In!"

Having arranged the class in a row with each man at attention, they can "count off." At the command "Count off!" all except the man at the extreme right end of the line (which is at the left hand of instructor), turn their heads and eyes to the right. Then the man at the right says *One*, the next *Two*, the next *Three*, and the next *Four*. As each man calls out his number he brings head and eyes to the front. After *Four* the next or fifth man counts *One* again. If desired the class can be numbered in twos instead of fours. The numbering is for convenience in giving commands when taking interval. If it is desired to arrange the class in two lines, the even numbers can be instructed to take two paces to the

"Count Off!"

rear while the uneven numbers remain as they are. The ranks can then be closed if desired.

Turning
in Class
Drills

After counting off, *facings*, or *turnings*, as they are called when it is desired to avoid all hint of the military, may be practiced. There are half-facings, facings and about-facings. The latter two are the most used. A turn to the left is done at the command, "Left, FACE." The body is pivoted on the left heel by raising the ball of the left foot and pressing on the ball of the right foot while raising its heel. When the body has turned 90 degrees to the left the ball of the left foot is lowered and the right foot is brought up even with the left. For "About FACE!" which is always done to the right, the right foot is drawn back and placed four inches, or (about half its length,) back of the left foot, and then the body is pivoted half way around on the ball of the right foot by pressure on the ball of the left, which is brought up to join the right one with snap when the movement is complete. The turns should be practiced in two counts, making the turn on the first count and bringing up the back foot on the second, until the movement becomes automatic, when the counting may be omitted. The facings or turnings may be used in arranging the class or while marching or running, except about face which cannot be executed while the class is in motion.

"Forward
March!"

When ready for marching the class may be given the command, "Right (or Left) FACE," so that the rank becomes a file and they are ready to go. The command to go is "Forward, MARCH!" At the command "Forward" the weight is shifted slightly to the right foot with an imperceptible movement. At the command "MARCH" the left foot is carried forward smartly and placed thirty inches in front of its starting point, the right foot then being advanced the same distance. This is continued at the rate of 120 paces to the minute until the command to halt is given. This is "Class, HALT." At the word "HALT" the foot at that moment striking the ground will take one step farther and the other foot will be brought up to join it smartly, with the pupil in the position of attention. Double-time is just twice as fast as ordinary marching. The command is "Double-time, forward, MARCH." If the class is already in motion the word forward is omitted. The knees are bent somewhat, as in running, so as to permit doubling

the number of steps to the minute. The arms are also bent much more than in ordinary marching, the elbows being held close to the sides; the fists are closed. The marching is carried on around the gymnasium, across it diagonally, or in any geometrical pattern desired. In making turns at corners if the class is marching in double file those on the inside must somewhat shorten their steps to allow those on the outside to keep in line with them. The class may also be marched by fours or eights, or it can be separated into two files, one going one way and the other in the opposite direction, or in the same direction on the other side of the room. There is an almost infinite variety of formations that may be used, from simple file marching up to maze running. The latter is used only for advanced classes.

In addition to the different formations there are different steps which may be utilized. Double-time has already been mentioned. Another variation is toe marching ("On the toes, MARCH."), which is the same as ordinary marching except that the heels are not allowed to touch the ground. A somewhat shorter step may be taken if desired. Marching with long or short steps, or with marked steps, may also be practiced. The latter consists in marking every second step by bringing the foot down with a sharp slap against the floor. Marching with knee-raising consists in bringing the knees well up at each step. In order to do this the step is shortened to eighteen inches and the time is made somewhat slower. Marching sideward and marching backward may be used but seldom are. Running is generally done in the same way as marching, except that a regular running step is used and the time is, of course, faster. Some marching should be done after the running before the command to halt is given.

If calisthenics are to follow the marching, which is generally the case, it is well to conclude the latter by having the class come down the floor by fours and stop in front of the instructor's platform. The proper interval and distance for the exercises can then be taken. The "interval" is the distance between pupils from side to side, and the "distance" is the space between ranks from front to back. At the command, "Raise arms and take interval right and left, MARCH!" the pupils Number One and Number Two, being on the right

Intervals in
Class Drills

of the line, execute a side-step to their right and Number Three and Number Four step in the opposite direction to their left, all raising their arms sideward, shoulder-high, and coming to a halt without command when the finger tips no longer touch. When all have reached position the command "Arms, Down!" is given. The proper distance between ranks, about forty inches, is then assumed, the ranks behind the front one stepping backward as may be necessary at the command "Take distance, MARCH!" If the instructor cannot clearly be seen by the rear ranks, the command may be given for every alternate rank to step one or two paces to the right.

The class is now ready for the drill. The problem of giving commands is then more complicated, especially if a number of exercises follow one another without a pause between. The same general plan of giving a command of preparation such as "Arms FORWARD," followed by a command of execution such as "RAISE," is used, but this is followed by counting, especially for amateur classes, or if there is no music. Whenever possible all the exercises, including the marching, should be done to music, as it helps in maintaining rhythm and makes the work much more interesting. If selections with which the pupils are familiar, particularly syncopated songs are used, they will exhibit much more energy and enthusiasm. A good pianist is a valuable asset to a gymnasium class. He or she should be able to vary the time of the music at will, so as to adapt it to the various exercises. Some movements can be done quickly, while others must be done quite slowly. Some exercises are done to two counts, others to four and a few to eight. For the slower movements waltz time is good, even though the count be two or four, as each full measure of waltz time can then be given one count. For marching a regular march selection is best. The beats should be well accented, regardless of the expression that would be demanded by the song if it were being played for its own sake.

Class Drills
to Music

As already explained, most of the exercises are started from the position of attention. The instructor describes and illustrates the movement in the following manner before the class starts. Suppose the movement is raising arms forward, shoulder-high, and returning to position. The instructor will say, "Arms forward raise, ONE!", and will immediately bring

the arms up with a snap to forward horizontal position, keeping elbows and wrists straight and palms of the hands down and separated the width of the chest. Then at "Two!" he will bring the arms down smartly to starting position. Then he starts the class by commanding "Ready, EXERCISE!" or "Ready, BEGIN! One, two, one, two," etc. When sufficient repetitions have been taken he stops the class by using the last two counts to command "Class, HALT!" If he has any criticisms to make this is the time for them, and if necessary the exercise is repeated. If he desires to give a number of exercises in succession, he illustrates them first and then alternates commands and counting until he finishes the series. When a change of movement is to be made, the counting is stopped and the necessary directions are given in the same cadence; then the command of execution, "Ready, CHANGE!", is given. Until this command is spoken the class continues with the former exercise as though the instructor were counting as usual. As a simple illustration, if the class is raising the arms forward and the leader wishes to change to the side, he will use the last two counts before he desires to change to give the command, "Side, CHANGE!" The greater the difference between the movements, the more directions will be needed and the more counts will be consumed in giving them. Occasionally for the sake of variety the instructor may, instead of counting, use the words "up, down, up, down," or any others that are suitable. As a rule it is not well to give too many exercises in succession without a halt, unless the drill is very familiar to the class, as the mental effort required to follow the commands of the leader consumes too much energy. When taking exercise it is desired to expend energy for this purpose and not for paying attention to complicated directions, or trying to remember a drill. It is to get exercise that the movements are performed.

Changing
Exercises in
Class Drills

The following movements, while not a complete drill, will serve as illustrations to show how such exercises would be conducted. The command given is the one that would be used in describing the exercise or position; the command to actually start the exercise is always "Ready, EXERCISE!" or "Ready, BEGIN!", followed by counting. The movements are numbered for reference.

No. 1. Flex and extend fingers, Flex—*One*, Extend—*Two*! At the word *One* the fingers are flexed by clenching the fist tightly; at the word *Two* they are extended stiffly, being still kept together. The hands are held at the sides with palms facing inward. This movement, being a light one, can be performed quite rapidly. It can also be done while holding the arms forward or sideward at shoulder-height, or at full arms' length above the head. These changes may be made without stopping the exercise by giving the commands, "Front, CHANGE! Side, CHANGE!" and "Up, CHANGE!" At the word CHANGE the last movement of the old exercise is executed, then the new position taken and the counting and new exercise continue without break. Other movements which can be performed in a similar manner include abduction and adduction of the fingers, flexion and extension of the wrists, rotation and circumduction of the wrists. All these are two-count exercises done at the same speed.

No. 2. Flex and extend arms, Flex—*One*, Extend—*Two*! At the word *One* the arms are flexed by bending at the elbows, drawing the forearms tightly against the upper-arms; at the word *Two* the arms are extended to the fullest possible extent. The fingers may be flexed along with the arms if desired, as it makes a better-looking movement. The upper-arm should remain in a perpendicular position.

No. 3. Flex and extend arms forward, Flex—*One*, Forward—*Two*, Flex—*Three*, Position—*Four*! This movement is a variation of the preceding one. Instead of returning the arms to starting position on the second count, they are extended forward at shoulder-height, flexed again on count three as on count one, and returned to position on count four. Other variations of this movement are to extend the arms to the side and overhead. The change may be made without stopping the exercise by using counts three and four to give the command, "Side, CHANGE!" or "Up, CHANGE!"

No. 4. Circumduct the arms, Forward! *One*, *Two*, etc. Circumducting means to describe a circle. In this case the hands describe a small circle, starting forward, then moving outward, then backward, then to first position. The full circle is described on one count, so that the leader may count progressively up to whatever number of times the movement is

to be performed; or he may count "one, two, one, two," etc.; or "one, two, three, four," and then repeat. The arms may be circumducted backward as well as forward, and the same movements may be performed while holding the arms forward or sideward, shoulder-high or at arm's length above the head. Large circles may be described if desired, in which case the count is somewhat slower and two counts are used for each circle.

No. 5. Bend head forward and backward, Front—*One*, Back—*Two!* While this is a two-count exercise it should not be done as rapidly as flexion and extension of the arms, as it will be inclined to make one dizzy. It should be done with a fair degree of snap, however, tensing the muscles tightly so as to carry the movement as far as possible in each direction. Variations of this exercise include bending the head sideward left and right, rotating it left and right and circumducting left and right. The circumducting, however, is a four-count movement, being: side—*One*, back—*Two*, other side—*Three*, front—*Four*.

Body Move-
ments in
Class Drills

No. 6. Shrug shoulders, Up—*One*, Down—*Two!* This is done at moderate speed in order to permit the shoulders to be raised as far as possible. On returning to position no effort is made to draw them downward, they are simply relaxed. Variations of this movement include drawing the shoulders forward and backward and circumducting the shoulders forward and backward. The latter is a two-count exercise, the same as the others.

No. 7. Bend body, Forward—*One*, Position—*Two!* It is well to do this exercise with the hands on the hips so as to hold the arms in position. While bending forward on the first count care is taken to keep the spine erect, the head in line with the body and the elbows back. The bend should be from the hips and not in the middle of the back. Body-bending must be done more slowly than any of the exercises thus far described. The exact rate of speed will depend upon the condition of the pupils. The instructor should not expect them to go as fast as he could. Variations of this exercise include bending backward, to each side, rotating left and right and circumducting left and right. Avoid straining in bending backward. Keep the hips firm when bending to the side. Cir-

cumducting is a four-count exercise, being: side—*One*, back—*Two*, other side—*Three*, front—*Four*, the same as when circumducting the head. A wide circle should be described, using a full bend of the body.

No. 8. Legs forward raise, alternating left and right, Left Up—*One*, Down—*Two*, Right Up—*Three*, Down—*Four!* The actual movement in this case is performed in two counts, and if desired it may be done with one leg at a time, counting “one, two, one, two”; but it makes a better exercise to alternate left and right and to count up to four so that each leg will be given equal attention. It is important to keep the legs straight and to point the foot forward. There is no need to see how high you can kick, simply raise the legs to horizontal. To vary this exercise raise legs to the side and rear. In each case avoid swaying the body any more than absolutely necessary to maintain balance.

Leg Move-
ments in
Class Drills

No. 9. Full knee-bending, Down—*One*, Position—*Two!* This exercise is usually performed with hands on hips. The knees are bent so as to lower the body until one sits on the heels. The heels are raised as the body is lowered. Care is taken to keep the spine erect and the head up. As the legs are straightened again the heels are lowered. This exercise may be done in either slow or rapid time, but the latter is employed only for advanced pupils and for brief periods. An easier variation of this exercise which can be done more rapidly is the half knee-bend. The heels are kept flat on the floor, and the knees are bent as far as they will go without lifting the heels.

No. 10. Raise and lower heels, Up—*One*, Down—*Two!* On the first count the heels should be lifted well up with considerable snap, taking care not to lose balance and to keep a good posture. The heels are lowered lightly on the second count. Do not come down with a thud. This is a comparatively light exercise and can be done quite rapidly. Variations include raising and lowering the toes, turning the toes out and in, turning the heels out and in, everting and inverting the ankles. All are two-count exercises done at the same speed. When raising the toes the body will have to slope somewhat forward to maintain balance, but during the other movements care is taken to keep a good upward stretch in the spine.

This series will complete a brief period of light all-round exercise. When it is desired to give more, combination movements in the standing, sitting and reclining positions may be added. Various starting positions are used, and more than two counts are generally required.

No. 11. Starting position, legs astride, hands clasped overhead. In this position the feet should be from eighteen to twenty-four inches apart, depending on the size of the person, and the arms should be kept absolutely straight and stretched. Swing arms down between legs and up again to position, *Down—One, Position—Two!* On the downward swing the arms should go well back between the legs so as to make the movement complete. On the upward swing the body should not sway backward any more than enough to keep the balance. Variations of this exercise include starting with the hands over one shoulder and swinging down, then up over the other shoulder; alternating the two; swinging the arms to the side, left and right, instead of overhead; and from starting position as given, swinging down, then unclasping the hands and spreading the arms to the side on the upward swing, bringing the hands together again for the downward swing and repeating. This latter movement will conclude with the position of arms spread to the sides, after which the command “Arms, Down!” is given.

**All-Around
Movements
in Class
Drills**

No. 12. Starting position, legs astride, arms extended sideward shoulder-high. Be sure to keep arms and legs straight. Swing the left hand forward and downward until it touches the right foot. The body will make a sideward and forward rotation and bend, the right arm being kept rigidly in position straight out from the shoulder. The command is: “Touch left hand to right foot—*One, Position—Two; touch right hand to left foot—Three, Position—Four!*” The exercise is performed to the left and right alternately until the command to halt is given.

No. 13. From regular starting position, stride forward with the left foot and raise both arms overhead—*One; bend forward and touch the hands to the toes—Two; return to erect position—Three; and back to original position—Four!* In striding forward keep the legs straight; also be careful not to let the arms bend as they are raised overhead. Let each part

of the exercise be distinct, coming to the proper position with a snap on the count. Alternate left and right legs. The same exercise may be performed striding to the side and raising arms sideward-upward overhead, then bending to the side until the hands touch the foot, and returning to position.

No. 14. From regular starting position do the full knee-bend, placing the braced fingers on the floor between the spread knees—*One*; jump backward with both legs to full length so that the body rests on the toes and hands—*Two*; return to squatting position—*Three*; and back to standing position—*Four*! At the conclusion of the backward jump with the legs, care is taken not to let the hips sag. The jump forward again to squatting position should be done smoothly with careful balance. Watch the position of the spine and shoulders on coming erect. An eight-count exercise similar to this may be taken as follows: Knee-bend as above—*One*; jump back—*Two*; raise left leg well up—*Three*; lower again—*Four*; raise right leg—*Five*; lower—*Six*; jump forward to squatting position—*Seven*; erect position—*Eight*!

No. 15. From regular starting position, lunge obliquely forward and outward with the left leg, at the same time raising the left arm obliquely forward and upward—*One*; return to position—*Two*; lunge obliquely to the right—*Three*; position—*Four*! Alternate left and right. In lunging the knee is well bent, but the arms and other leg are kept straight. The raised arm, the body and the rear leg should form a straight line, but in a forward-slanting direction. Take positions with snap and vigor and keep the chest and head up.

No. 16. From regular starting position, jump to stride position, at the same time raising both arms sideward-upward overhead—*One*; jump back to position—*Two*; repeat continuously with no pause between movements. The count may be one, two, one, two, etc.; or one, two, three, four, etc. Arms and legs must be kept straight and spine erect. A variation of this is done by starting with the left leg forward and the right (or left) arm raised, then reversing the position of the arms and legs with a rapid jumping movement.

No. 17. Sitting position, legs together and extended straight forward, body leaning slightly backward and supported on the arms which are spread somewhat to the side.

Flex thighs and knees together so as to draw the latter well up to the chest, then extend the legs again to first position. Count: flex knees—*One*, extend—*Two*! Keep the legs together during the entire movement and point the toes as the legs are extended. This may be done with one leg at a time, alternating left and right, and counting one, two, three, four. Another variation is to raise the straight leg instead of bending the knee.

No. 18. Reclining face-up position with arms extended on a level with the shoulders and feet spread three feet apart. Raise the body to sitting position—*One*; rotate the body to the right and touch the left hand to the right foot—*Two*; return to face-forward position—*Three*; back to reclining position—*Four*! Repeat, rotating the body to the left and touching the left foot with the right hand. The feet may be held or fastened down if necessary. Care is taken to keep the spine erect while in sitting position.

No. 19. Reclining face-down position with elbows bent so as to bring the palms of the hands down on the floor just beneath the shoulders. Push the body up with the arms—*One*; raise hips and swing them backward until the buttocks touch the heels—*Two*; return hips to the floor—*Three*; lower the body—*Four*! At the first push-up the body bends at the hips so as to allow the latter to remain on the floor. Be sure to straighten the arms. Do not move the hands when swinging the body backward.

No. 20. Reclining face-down position with arms extended overhead. Raise left arm and right leg as far as possible—*One*; lower—*Two*; raise right arm and left leg—*Three*; lower—*Four*! Get the arm and leg up as far as possible without bending the knee or elbow to any appreciable extent. Be sure to relax the muscles not in use.

BREATHING EXERCISES.—There are many breathing exercises which may be interpolated between the exercises just described, or used before and after. Various examples will be found in other parts of this book. A few will be given here merely to show the manner of counting.

No. 1. Raise heels and arms forward-upward stretch—**INHALE**, down—**EXHALE**! The arms and heels are raised together with a slow smooth movement as the breath

The Breathing Exercise as a Starter

is drawn in, reaching the top of the stretch when the lungs are filled. The return to position is also made gradually as the breath is exhaled. Keep arms straight. A variation would be arms side-upward.

No. 2. Raise arms sideward, shoulder-high—**INHALE**; hold the breath and rotate the body—**RIGHT—LEFT**; lower arms—**EXHALE**! The arms are raised slowly, and when the lungs are filled the body rotation is performed quickly and with vigor while holding the breath; the arms are then lowered slowly during exhalation. The lungs should not be filled to the utmost capacity when the breath is to be held and the hold should always be brief.

Breathing
Exercises
in Class
Drills

The command to inhale may be given with snap and vigor and followed by silence during the actual breathing; or the leader may avoid breathing himself and give the commands to inhale and exhale in a slow long-drawn-out manner, similar to that in which the breathing itself is performed. For example, "in-n-n-ha-a-a-le, e-e-e-xha-a-a-le." Music may or may not be played while breathing, but it is seldom employed to give the rhythm, as it is difficult to render or to follow for this purpose. If there is music, it is generally played softly in waltz time, merely as an accompaniment to the breathing.

The outline drill given here is not intended to follow any particular system, but will give the desired all-round exercise. If the strict Swedish system is used, a definite order of exercise must be followed, and the leader does not perform the exercises himself. The strict Swedish drill is rarely used in America except in schools of physical education. If a wand or dumb-bell drill is to be given, the same general plan as described above is followed.

During the games which follow the exercises the instructor acts as umpire or referee, as well as coach, instructing, criticizing and rendering decisions. If the class is quite small, however, he may take part in order to make a team. As already mentioned, the games most commonly used are volley-ball, indoor baseball and medicine-ball. Instructions for these will be found under their respective headings. Competition should not be allowed to become too keen in these games. In choosing sides the instructor should see that the pupils are matched as evenly as possible.

In striving to make progress there may be some tendency to overdo, and this must be avoided. The length of the exercise period will vary with the needs of the class as a whole, and will seldom in itself be too much for any student. It is in doing extra work that there is the possibility of overexertion. Pupils should consult their instructor before doing such extra exercise. The instructor will also arrange each exercise period so as to give the proper amount of time to each form of exercise. This will be determined not only by the needs of the pupils, but by the time available and the special ends desired. The usual length of an exercise period is from thirty to fifty minutes. The thirty-minute period seldom includes any apparatus work, generally being arranged as follows:

Arrange-
ment of
Class Drills

ARRANGEMENT OF THIRTY-MINUTE EXERCISE PERIOD

Turnings (facings) and marching	5 minutes
General calisthenics	10 "
Games	15 "
	—
Total	30 "

The calisthenics should include at least one minute of breathing. The exercises themselves will consist of simple and combination movements in the standing position. If it is desired to give more attention to exercise and less to games, the former period may be lengthened to fifteen minutes and the latter shortened to ten, but it is seldom advisable to omit the games entirely. For a longer period of exercise the arrangement would generally be as follows:

ARRANGEMENT OF FIFTY-MINUTE EXERCISE PERIOD

Turnings (facings) and marching	5 minutes
Calisthenics—simple movements	10 "
" —combination movements	5 "
" —floor movements	10 "
Games	20 "
	—
Total	50 "

In this period at least two minutes of breathing should be included with the calisthenics. If it is desired to use some running, the marching period may be lengthened two or three

minutes and this time subtracted from the game period. If it is desired to give some apparatus work, it may be substituted for the floor or both the floor and combination movements. As a rule, however, apparatus work will be given in a special class, with the movements properly graduated. Marching and breathing may be included in such a class, and the latter should be. The time consumed in falling in, receiving general instructions, and returning equipment to its proper place will lengthen the fifty-minute period to an hour.

It is not necessary to adhere to hard and fast rules in arranging an exercise period so long as the requirements cited in *How to Exercise* and *When to Exercise* are met.

